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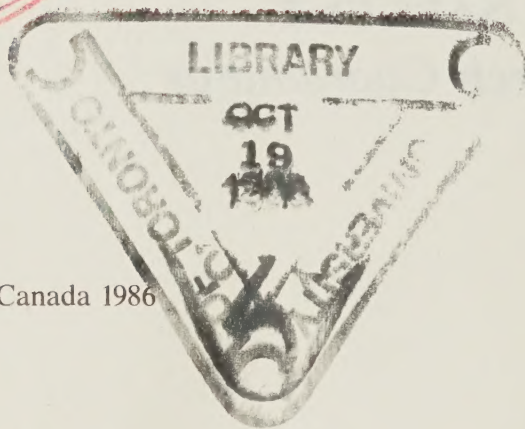
Postwar Macroeconomic Developments

JOHN SARGENT
Research Coordinator

*Published by the University of Toronto Press in cooperation
with the Royal Commission on the Economic Union and
Development Prospects for Canada and the Canadian
Government Publishing Centre, Supply and Services Canada*

University of Toronto Press
Toronto Buffalo London

Grateful acknowledgment is made to the following for permission to reprint previously published and unpublished material: Canada Mortgage and Housing Corporation; *Canadian Journal of Economics*.



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Printed in Canada
ISBN 0-8020-7262-3
ISSN 0829-2396
Cat. No. Z1-1983/1-41-20E

CANADIAN CATALOGUING IN PUBLICATION DATA

Main entry under title:
Postwar macroeconomic developments

(*The Collected research studies / Royal Commission on the Economic Union and Development Prospects for Canada*,
ISSN 0829-2396 ; 20)
Includes bibliographical references.
ISBN 0-8020-7262-3

1. Canada — Economic conditions — 1945— — Addresses, essays, lectures.
2. Macroeconomics — Addresses, essays, lectures. I. Sargent, John. II. Royal Commission on the Economic Union and Development Prospects for Canada. III. Series: *The Collected research studies (Royal Commission on the Economic Union and Development Prospects for Canada)* ; 20.

HC115.P67 1985 339'.0971 C85-099510-8

PUBLISHING COORDINATION: Ampersand Communications Services Inc.
COVER DESIGN: Will Rueter
INTERIOR DESIGN: Brant Cowie/Artplus Limited

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FOREWORD

When the members of the Rowell-Sirois Commission began their collective task in 1937, very little was known about the evolution of the Canadian economy. What was known, moreover, had not been extensively analyzed by the slender cadre of social scientists of the day.

When we set out upon our task nearly 50 years later, we enjoyed a substantial advantage over our predecessors; we had a wealth of information. We inherited the work of scholars at universities across Canada and we had the benefit of the work of experts from private research institutes and publicly sponsored organizations such as the Ontario Economic Council and the Economic Council of Canada. Although there were still important gaps, our problem was not a shortage of information; it was to interrelate and integrate — to synthesize — the results of much of the information we already had.

The mandate of this Commission is unusually broad. It encompasses many of the fundamental policy issues expected to confront the people of Canada and their governments for the next several decades. The nature of the mandate also identified, in advance, the subject matter for much of the research and suggested the scope of enquiry and the need for vigorous efforts to interrelate and integrate the research disciplines. The resulting research program, therefore, is particularly noteworthy in three respects: along with original research studies, it includes survey papers which synthesize work already done in specialized fields; it avoids duplication of work which, in the judgment of the Canadian research community, has already been well done; and, considered as a whole, it is the most thorough examination of the Canadian economic, political and legal systems ever undertaken by an independent agency.

The Commission's research program was carried out under the joint

direction of three prominent and highly respected Canadian scholars: Dr. Ivan Bernier (*Law and Constitutional Issues*), Dr. Alan Cairns (*Politics and Institutions of Government*) and Dr. David C. Smith (*Economics*).

Dr. Ivan Bernier is Dean of the Faculty of Law at Laval University. Dr. Alan Cairns is former Head of the Department of Political Science at the University of British Columbia and, prior to joining the Commission, was William Lyon Mackenzie King Visiting Professor of Canadian Studies at Harvard University. Dr. David C. Smith, former Head of the Department of Economics at Queen's University in Kingston, is now Principal of that University. When Dr. Smith assumed his new responsibilities at Queen's in September 1984, he was succeeded by Dr. Kenneth Norrie of the University of Alberta and John Sargent of the federal Department of Finance, who together acted as Co-directors of Research for the concluding phase of the Economics research program.

I am confident that the efforts of the Research Directors, research coordinators and authors whose work appears in this and other volumes, have provided the community of Canadian scholars and policy makers with a series of publications that will continue to be of value for many years to come. And I hope that the value of the research program to Canadian scholarship will be enhanced by the fact that Commission research is being made available to interested readers in both English and French.

I extend my personal thanks, and that of my fellow Commissioners, to the Research Directors and those immediately associated with them in the Commission's research program. I also want to thank the members of the many research advisory groups whose counsel contributed so substantially to this undertaking.

DONALD S. MACDONALD



INTRODUCTION

At its most general level, the Royal Commission's research program has examined how the Canadian political economy can better adapt to change. As a basis of enquiry, this question reflects our belief that the future will always take us partly by surprise. Our political, legal and economic institutions should therefore be flexible enough to accommodate surprises and yet solid enough to ensure that they help us meet our future goals. This theme of an adaptive political economy led us to explore the interdependencies between political, legal and economic systems and drew our research efforts in an interdisciplinary direction.

The sheer magnitude of the research output (more than 280 separate studies in 70+ volumes) as well as its disciplinary and ideological diversity have, however, made complete integration impossible and, we have concluded, undesirable. The research output as a whole brings varying perspectives and methodologies to the study of common problems and we therefore urge readers to look beyond their particular field of interest and to explore topics across disciplines.

The three research areas, — *Law and Constitutional Issues*, under Ivan Bernier; *Politics and Institutions of Government*, under Alan Cairns; and *Economics*, under David C. Smith (co-directed with Kenneth Norrie and John Sargent for the concluding phase of the research program) — were further divided into 19 sections headed by research coordinators.

The area *Law and Constitutional Issues* has been organized into five major sections headed by the research coordinators identified below.

- Law, Society and the Economy — *Ivan Bernier and Andrée Lajoie*
- The International Legal Environment — *John J. Quinn*
- The Canadian Economic Union — *Mark Krasnick*

- Harmonization of Laws in Canada — *Ronald C.C. Cuming*
- Institutional and Constitutional Arrangements — *Clare F. Beckton and A. Wayne MacKay*

Since law in its numerous manifestations is the most fundamental means of implementing state policy, it was necessary to investigate how and when law could be mobilized most effectively to address the problems raised by the Commission's mandate. Adopting a broad perspective, researchers examined Canada's legal system from the standpoint of how law evolves as a result of social, economic and political changes and how, in turn, law brings about changes in our social, economic and political conduct.

Within *Politics and Institutions of Government*, research has been organized into seven major sections.

- Canada and the International Political Economy — *Denis Stairs and Gilbert Winham*
- State and Society in the Modern Era — *Keith Banting*
- Constitutionalism, Citizenship and Society — *Alan Cairns and Cynthia Williams*
- The Politics of Canadian Federalism — *Richard Simeon*
- Representative Institutions — *Peter Aucoin*
- The Politics of Economic Policy — *G. Bruce Doern*
- Industrial Policy — *André Blais*

This area examines a number of developments which have led Canadians to question their ability to govern themselves wisely and effectively. Many of these developments are not unique to Canada and a number of comparative studies canvass and assess how others have coped with similar problems. Within the context of the Canadian heritage of parliamentary government, federalism, a mixed economy, and a bilingual and multicultural society, the research also explores ways of rearranging the relationships of power and influence among institutions to restore and enhance the fundamental democratic principles of representativeness, responsiveness and accountability.

Economics research was organized into seven major sections.

- Macroeconomics — *John Sargent*
- Federalism and the Economic Union — *Kenneth Norrie*
- Industrial Structure — *Donald G. McFetridge*
- International Trade — *John Whalley*
- Income Distribution and Economic Security — *François Vaillancourt*
- Labour Markets and Labour Relations — *Craig Riddell*
- Economic Ideas and Social Issues — *David Laidler*

Economics research examines the allocation of Canada's human and other resources, the ways in which institutions and policies affect this

allocation, and the distribution of the gains from their use. It also considers the nature of economic development, the forces that shape our regional and industrial structure, and our economic interdependence with other countries. The thrust of the research in economics is to increase our comprehension of what determines our economic potential and how instruments of economic policy may move us closer to our future goals.

One section from each of the three research areas — The Canadian Economic Union, The Politics of Canadian Federalism, and Federalism and the Economic Union — have been blended into one unified research effort. Consequently, the volumes on Federalism and the Economic Union as well as the volume on The North are the results of an interdisciplinary research effort.

We owe a special debt to the research coordinators. Not only did they organize, assemble and analyze the many research studies and combine their major findings in overviews, but they also made substantial contributions to the Final Report. We wish to thank them for their performance, often under heavy pressure.

Unfortunately, space does not permit us to thank all members of the Commission staff individually. However, we are particularly grateful to the Chairman, The Hon. Donald S. Macdonald; the Commission's Executive Director, J. Gerald Godsoe; and the Director of Policy, Alan Nymark, all of whom were closely involved with the Research Program and played key roles in the contribution of Research to the Final Report. We wish to express our appreciation to the Commission's Administrative Advisor, Harry Stewart, for his guidance and advice, and to the Director of Publishing, Ed Matheson, who managed the research publication process. A special thanks to Jamie Benidickson, Policy Coordinator and Special Assistant to the Chairman, who played a valuable liaison role between Research and the Chairman and Commissioners. We are also grateful to our office administrator, Donna Stebbing, and to our secretarial staff, Monique Carpentier, Barbara Cowtan, Tina DeLuca, Françoise Guilbault and Marilyn Sheldon.

Finally, a well deserved thank you to our closest assistants: Jacques J.M. Shore, *Law and Constitutional Issues*; Cynthia Williams and her successor Karen Jackson, *Politics and Institutions of Government*; and I. Lilla Connidis, *Economics*. We appreciate not only their individual contribution to each research area, but also their cooperative contribution to the research program and the Commission.

IVAN BERNIER
ALAN CAIRNS
DAVID C. SMITH



The Royal Commission's Macroeconomics Research Program was designed to shed light on the macroeconomic evolution of the Canadian economy over the postwar period (particularly over the last two decades), on current macro policy issues, and on overall prospects for the Canadian economy. The results of the research program have provided background for the Commission's Final Report. The individual studies that constituted the research program are contained in volumes 19 through 25 of the Economics section of the research publication series.

Volume 20 canvasses various aspects of Canadian macroeconomic performance over the past twenty to forty years, and also includes discussion of the international monetary system within which the Canadian economy has functioned.

"Economic History and Canadian Economic Performance since the Second World War," by Ian Drummond, first discusses the general role and the limitations of Canadian economic history and its interpretation in contributing to our understanding of recent Canadian economic growth. Then, in the course of a general review of postwar economic developments in Canada, it focusses particular attention on external and domestic factors contributing to strength or weakness in the pace of demand growth, and on the light that developments in the structure of employment can shed on the evolution of, and prospects for, productivity growth.

"Prices in the Postwar Period," by Brian O'Reilly, examines the evolution of thinking on macroeconomic theories of price determination, with particular emphasis on explanations offered for price (or inflation) rigidity in the face of changes to nominal demand and on linkages between macroeconomic and microeconomic behaviour.

“Price Flexibility and Business Cycle Fluctuations in Canada: A Survey,” by Brian O’Reilly, W.R. White and Robert Ford, reviews the facts relevant to the cyclical relationship between various measures of price inflation and movements in output, with the focus on the recession period. Such aspects as industrial concentration, the industrial composition of output, the openness of the economy, the degree of regulation and income distribution are discussed in the framework of a classical business cycle. The paper then surveys recent developments in theoretical models of the inflationary process and in the price-wage sectors of a selection of current Canadian macroeconomic models.

“Indexation and the Adjustment to Inflation in Canada,” by Peter Howitt, reviews the various ways in which Canadian labour and financial markets adjusted to inflation. It discusses the extent to which the adoption of explicit indexation formed part of this response, the reason why indexation was not more widely adopted in financial markets, and the merits of a wider use of indexation.

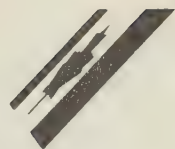
“International Monetary Economics in Theory and Practice,” by David Laidler, reviews the evolution of monetary theory as applied to the international economy and to individual open economies. The theoretical developments are put in the context of, and applied to, developments in inflation, interest rates and exchange rates in the world economy over the postwar period.

“International Asset Substitutability,” by Paul Boothe, Kevin Clinton, Agathe Côté and David Longworth, is a summary of a longer technical study by these authors. It assesses the empirical evidence as to the degree of mobility of the principal categories of capital flows, particularly between Canada and the United States, and it examines the implications of capital mobility for exchange market intervention and for monetary and fiscal policy.

“Developments in Canadian Financial Markets: 1962–82,” by John Chant and Steve Easton, makes use of unadjusted and inflation-adjusted financial flow accounts to examine changing patterns of sources and uses of finance by the business, personal, government and foreign sectors in the Canadian economy. The evolving roles of the different categories of financial intermediaries are considered.

These papers, when coupled with the discussion of labour markets in volume 25 of the Commission’s research studies and with the discussion of the evolution of policy in volume 21, provide broad coverage of key determinants of, and developments in, the postwar Canadian macroeconomic experience.

JOHN H. SARGENT



The Commission's Macroeconomics Research Studies Program benefited from the advice and assistance of a great many individuals.

David C. Smith, Research Director of the overall Economics Research Program, had a major role in conceiving the broad outlines of the Macroeconomics Program, and provided invaluable advice throughout.

The members of the Macroeconomics Research Advisory Group gave generously of their time and their expertise; their advice made a major contribution to the design of the program, to the development of terms of reference for the individual studies, and to the review of early drafts of the studies. The Research Advisory Group members were John Crow, Senior Deputy Governor, Bank of Canada, Ottawa; Wendy Dobson, Executive Director, C.D. Howe Institute, Toronto; Pierre Fortin, Professor of Economics, Laval University, Quebec; Charles Freedman, Adviser, Bank of Canada, Ottawa; John Grant, Vice-President and Chief Economist, Wood Gundy, Inc., Toronto; John Helliwell, Professor of Economics, University of British Columbia, Vancouver; David Laidler, Professor of Economics, University of Western Ontario, London, Ont.; Paul-Henri Lapointe, Director, Special Projects and Policy Analysis Division, Department of Finance, Ottawa; John McCallum, Professor of Economics, University of Quebec at Montreal; Sylvia Ostry, Ambassador for Multilateral Trade Negotiations, Department of External Affairs, Ottawa; Ross Preston, Senior Project Director, Economic Council of Canada, Ottawa; Douglas Purvis, Professor of Economics, Queen's University, Kingston; Brian Scarfe, Professor of Economics, University of Alberta, Edmonton; Alasdair Sinclair, Vice-President (Academic), Dalhousie University, Halifax; David Slater, Chairman,

Economic Council of Canada, Ottawa; Gordon Sparks, Professor of Economics, Queen's University, Kingston; William White, Adviser, Bank of Canada, Ottawa; and Thomas Wilson, Professor of Economics, University of Toronto.

Commissioner Clarence L. Barber provided valuable comments on a number of the individual studies.

Craig Riddell who, in addition to his responsibilities as Research Coordinator of the Labour Markets and Relations Section of the Economics Research Program, attended several meetings of the Macroeconomics Research Advisory Group and contributed significantly to the overall Macroeconomics Program.

The referees of the individual studies, who were mainly drawn from the Canadian academic community and some of whom were also members of the Research Advisory Group, in all cases made best efforts to assess the studies against the unique requirements of a Royal Commission research program and provided useful suggestions and comments on the individual studies.

The highly competent and energetic assistance of Barbara Cowtan, secretary, and of researchers Judith Gold and Douglas Green was of immense help. The efforts of Lilla Connidis — the Assistant Director, Economics Research — and Tina DeLuca, Marilyn Sheldon, and Donna Stebbing of the secretarial staff were also essential to the administration and processing associated with individual studies, and to the organization of symposia and of Research Advisory Group meetings.

Lastly, the authors of the individual studies contributed not only through the quality of their individual work but through doing their best to shape the coverage of their studies to the suggested specifications — which were always provided but often less than pellucid — to meet deadlines that were tight, and to respond to the multiple and not always consistent suggestions of referees, RAG members, copy editors, and the coordinator.

All the above deserve much credit for whatever of value may have been produced in the course of the Macroeconomics Research Program, but responsibility for any gaps in the program, and for failures to explore particular approaches to the individual topics considered, properly rests with the coordinator.

J.H.S.



Economic History and Canadian Economic Performance since the Second World War

IAN DRUMMOND

Introduction

This report has five components. In the first section we survey some of the traditional approaches in Canadian economic historiography, and a selection from the larger literature of economic history, together with a general account of the international economic context within which Canada's own postwar development can be seen.

The second section is a narrative account of the course of economic growth since 1945. It will be seen that, contrary to an increasingly common impression, the record in terms of employment, unemployment, and living standards was a creditable one until the onset of the current recession. However, in Canada as in other industrialized countries, labour productivity grew less rapidly in the 1970s than in earlier decades, and the same appears to be true with respect to total factor productivity.

The third section deals with structural changes in the ways that labour is used. It surveys the occupational and industrial structure of the labour force, concluding that Canada, like other industrialized countries, now employs strikingly large proportions of its workers in service industries and in white-collar occupations. Furthermore, in Canada as in other countries, in absolute terms, agriculture is no longer declining.

The fourth section contains examinations of a group of large apocalyptic visions, most deriving their force from the changed distribution of labour, and all suggesting that some sort of productivity impasse has somehow been reached because of the way our economy has been evolving in the past 40 years. It is concluded that these apocalyptic visions are not very helpful or insightful, at least on the Canadian scene,

but that the real income growth of the 1950s and 1960s may be hard to regain, given the current patterns of demand for output, available technologies, and the ways Canadian labour is now used. This section also examines the long-wave hypotheses, and surveys some elements in the international context. Special interest is found to attach to Cornwall's "convergence" thesis, and to Beenstock's emphasis on the industrialization of the less developed world.

The fifth section, a brief conclusion, suggests that we should be careful to distinguish between the attack on privilege and the advocacy of a flexibility that may in fact be unattainable, or unacceptable to the populace.

History, Historiography, and the Postwar Era

Introduction

This section is meant to provide an interpretative framework and to define a point of view from which the longer-run evolution of our national economy can be surveyed. For policy makers and for the economics profession at large, a contribution of this sort may well be the most valuable thing that economic history has to offer. We begin by discussing traditions in Canadian economic historiography. In the latter part of the section we discuss what I have called the "general sensibility of economic historians" with respect to continuity and change, invention and innovation, and comparative growth performance in the industrialized world since 1945. It is suggested that one need not regard the period 1950–73 as normative, that the period was not typical, and that the historical record is replete with pauses, reversals, and times both bad and good; therefore, the misadventures of the 1970s should not be a cause of cosmic despair, nor should the cyclical downturn of the early 1980s be regarded as abnormal; such things have happened many times in the past.

Canadian Economic Historians

Until recently, Canadian economic historians showed little interest in productivity. Nor did they concern themselves to any extent with living standards which, they implied, tended to remain static or to decline. As in so many other matters, the tone was set by H.A. Innis. He argued¹ that in Canada, living standards were determined by the attitudes of European immigrants: anxious to maintain some standard that they had in their heads to begin with, they tried to find means by which they could attain this standard, in the process developing the succession of "staple industries" — cod fishing, fur trading, lumbering, wheat production, cheese, non-ferrous metals mining, pulp and paper production — which

Innis believed to have characterized Canada's economic development at least to the 1930s. In this scheme of things, Canadians lived well when there were good opportunities for staple exports, either in volume or price terms. When external markets turned sour, Canadians lived less well, unless a new staple happened along at the same time as an old staple was declining. Such periods as the 1870s and 1880s, when old staples were expiring and new staples were slow to develop, appeared almost by definition as times of depression, which, it was inferred but seldom stated explicitly, were times of low or falling living standards.

Similarly, if an area was outside the charmed circle of staple production, it was supposed that its inhabitants lived badly, and that improvement could not occur. Such areas were Quebec after the middle of the 19th century, and parts of the Atlantic Provinces from the 1860s until the Second World War. Connected with staple production, in the Innis scheme, was occasional but massive government spending on infrastructure — first canals, then railways. Also, insofar as the later staples, such as pulp and paper, involved considerable investment, there was a further stimulus to capital spending. But investment always went too far, whether encouraged by the state or not; foreign borrowing proved excessive, and heavy “fixed charges” resulted, burdening the citizens and upsetting the balance of payments, especially when external markets did turn sour, as in the 1920s for some export products, and in the 1930s for almost all of them.

Innis naturally was concerned to trace the actual development of the various staple trades. But neither he nor his followers ever tried to trace the movement of living standards; the matter was disposed of by assumption, so that no research was needed. Nor was Innis much interested in manufacturing. Of course he had to recognize that by 1929 there was a good deal of factory production, especially in that part of central Canada where he resided. Again, however, the matter was assumed or asserted into its preordained place: central Canada grew factories because of backward linkages from the staple activities — from railway building, Western settlement, and the development of mines and pulp in Quebec and Northern Ontario.²

Among Canadian economic historians Innis' ideas no longer prevail. In the past quarter-century a good deal of work has been done on the manufacturing sector and on living standards. There is now little argument about the fact that, at least since Confederation, Canada's manufacturing industry has been tending to expand, and few observers would now link that expansion in any simple way to the staple industries that interested Innis. Indeed, in a classic paper, Chambers and Gordon (1966) argued that the Prairie wheat boom of 1896–1913 could not possibly have had much effect on per capita real income — a conclusion that Innis would presumably have accepted, but an answer to a question that he never explicitly asked. A rebuttal by Dales, McManus, and Watkins

(1967) made explicit for the first time that the “staples thesis” was a scheme for extensive growth, not for intensive development, except insofar as staple-type development increased the effective natural-resource base of the economy and/or increased the rents from those resources. Furthermore, since 1965 a good deal of heat and some light have been produced by a new generation of Marxist labour historians (Kealey, 1980; Palmer, 1979). Anxious to study the life and work of the working classes, they have found it essential to identify and trace the development of manufacturing, especially between 1867 and 1914. After all, there is little point in studying the working class unless one has some reason to believe it to be significant, increasing and, in the Marxist vocabulary, self-conscious. It is also helpful if one can demonstrate that workers are becoming increasingly miserable, and to that end, with rather less success, some of the new labour historians (Piva, 1979) have bent their efforts. However, this work has not done much to increase our understanding of the processes that may affect the movement of productivity and living standards, because Marxian exploitation models, which they all employ in one form or another, tell us little about either matter. As for mainstream non-Marxist economic historians, they are beginning to study the movement of productivity within individual industries. In particular, important work has been done on agriculture and transportation by McInnis, Lewis, and Green (Lewis, 1975). However, such work has yet to push very far into the realm of explanation; thus far, most of it remains at the level of description. Furthermore, it is little concerned with developments since 1945.

Nevertheless, if we consider the work of Canadian economic historians as a whole we might be able to infer an implicit theory — a sort of implicit world view — about the determinants of movements in productivity growth and living standards. First of all, we have the market conditions for export products that draw on Canada’s natural resource base in some significant way. Second, we have the terms of international trade, distinguished from the first chiefly in that much of the older literature is cast in a “vent-for-surplus” mould, not explicitly in the mould of relative prices. And third, we have the rate and particular character of technological change outside Canada. Indeed, Canadian economic historians write as if most of the “really significant” inventions all occur abroad. The only important exception would be certain strains of wheat which were developed in the Dominion. The critical inventions, furthermore, are ones that increase the payoff from some natural resource — nonferrous ores, forests, hydro-electric sites, farmland, even the fisheries. Such inventions involve new methods of extraction, new kinds of transport, new uses for things previously not considered resources at all. With respect to branch plants and the manufacturing sector generally, it has commonly been recognized that new technologies and new products often came with foreign ownership, and as the manufacturing sector has been more closely studied it has

come to be understood that domestically controlled firms have also been anxious to borrow foreign product and process technology. Conversely, and most importantly in the work of Dales (1966), it has been noticed that the protective tariff prevented Canada from seizing all such benefits. That is to say, because of the small protected domestic market, manufacturers have often been obliged to import foreign technology and then to use it in a way that is not optimal, at least in technological terms, with depressing effects on real earnings and living standards. Economic historians, however, have rarely tried to measure those effects in any serious way. One exception is the Gordon Commission study by Young (1957).

A fourth factor, which has become increasingly relevant in studies of 19th-century agriculture, might be called “pressure of population on the land.” The topic has been approached differently in Quebec and in Ontario, both of which were primarily agricultural provinces until after 1900. In Lower Canada, almost everyone now agrees, there was some sort of “agricultural crisis” early in the 19th century, which resulted from a mismatch between growing population, unrewarding and limited arable land, and inadequate technology. The precise course and cause of the crisis are, naturally, matters of dispute.³ As for Ontario, it has been known for some time that the mid-century wheat economy of Canada West was in trouble because of soil depletion and pests, while some observers have detected a mid-century crisis, the reflection of population pressure, given the fact that by 1850 there were few available new farmsteads in the fertile belt.⁴ It has also been noticed that between 1867 and 1929, both in Ontario and in Quebec, agricultural settlement was pushed into regions where the land would not provide a decent living. Furthermore, recent research has found that from the early 1880s until the early 1940s, Ontario farmers did not manage to produce any important trend increase in yields per acre, and that for the first 40 years of the 20th century the same was true of animal slaughter-weight. The average cow yielded more milk; nothing else went up significantly, or at all, while some yields and outputs went down.⁵ There are interesting implications for resource use in agriculture, and for farm living standards. It would appear that Ontario farmers bettered themselves by changing the mix of their activities and, to some extent, by spending on labour-saving equipment. These are not circumstances that produce a rapid upward movement in living standards!

Insofar as Canadian economic historians have studied other countries, they are likely to find this same orientation in other economic historiographies. That is to say, the profession is generally inclined to concern itself with:

- the natural resource base;
- an international process of invention;

- processes by which inventions are diffused across international boundaries; and
- the essentially random or unpredictable impact of invention, in that the utility of an invention depends on the local resource base, and perhaps on the local institutional structure as well.

It is also common to argue that the payoff from diffusion is hard to predict, depending as it does not only on input and output prices but on the skill with which the new idea is applied. Harvey Leibenstein's "x-efficiency"⁶ was no new idea to economic historians, although none of them had formalized it. Thus there is a common professional interest in institutional structures and attitudes — an unwillingness to stop with simple models of rational profit-maximization, an insistence that things can go wrong for reasons connected with ignorance, carelessness, failures of foresight, and other circumstances that can be assimilated into maximizing behaviour only in a tautological fashion.

There is, furthermore, a special professional interest in investment and investment behaviour. In the Canadian context, that interest reflects Innis's concern about the link between investment and extensive growth on a staple basis. Without appropriate new investment, new staples often could not be exploited effectively, or at all. It was not possible to transform the decaying habitant farmsteads of Quebec into Prairie farmsteads; to transport Prairie wheat to market, the St. Lawrence canals would have had to be reconstructed, and more railways would have been needed, too. Technological diffusion, moreover, generally seems to have needed embodiment in specific sorts of capital goods. On the other hand, most of the economic historians now practising in Canada have been influenced by their graduate training, and by teaching exigencies, to operate from time to time with the textbook concept of "capital," an apparently homogeneous input analogous to "labour." In teaching, and in general interpretative work, most Canadian economic historians continue to devote a good deal of attention to the "accumulation of capital," and to some extent this phrase is so interpreted as to include "human capital" as well. Some are aware of the extended and tangled debate⁷ regarding the "nature of capital" and the problems connected with measuring it; of those who have tried to follow this debate, it is probably reasonable to say that few are now comfortable with the idea of "capital" as a homogeneous and readily transformable input. Besides, on encountering the calculations, whether for Canada or for other countries, which attempt to show that "capital" has not made a large proportionate contribution to growth in output or in income per capita, many economic historians are probably inclined to think that something has gone wrong with the data, the calculations, or the conceptual framework.

In reporting the views of Canadian economic historians, we do not mean to imply that these views are necessarily correct. But in chronic-

ling and describing the nation's development, economic historians do learn things that other varieties of economists customarily do not know — especially in the 1980s. The professional viewpoint, therefore, deserves to be taken seriously, if only for what it can contribute to the pool of common knowledge.

Demographics

Similar comments are apposite with respect to demographic growth. It is absolutely certain that the Canadian labour force has not grown in an “autonomous” fashion to which the rest of the economic system has adjusted. In some decades, as in the 1930s and the period 1871–1901, the nation did not retain its own demographic increase; in other decades, as in the period 1901–31, the 1950s, and the 1960s, net immigration made an important contribution to the growth not only of population but of labour force. Roughly speaking, when Canada was especially prosperous, it attracted a positive net immigration; when in a deep slump, as in the 1930s, there was net emigration, and in some other periods when prosperity alternated with less severe depression, as in the last 30 years of the 19th century, the same was the case. Gross immigration was sizable in almost all decades; only in the 1930s and in wartime was it of little account. Gross emigration, chiefly to the United States, was equally regular and often sizeable. There have also been periods, such as the 1920s, when numbers of European workers came to Canada for short periods of time, returning to their countries of origin before many years had passed. In the 1970s and 1980s, with much stricter immigration controls at the American frontier, it has become much more difficult for the native-born to emigrate; meanwhile, the attractions of Canada as a “land of opportunity” are undiminished, and our own immigration arrangements, though increasingly modulated on the basis of labour demand, are not entirely successful in managing the inflow.

Labour

It follows that the quantity of labour cannot be regarded as a constraint on national economic growth but that, perhaps, inflows of labour must be expected to restrain the growth of income per head. This conclusion is not a very firm one, if there is anything to be said for the Kindleberger-Lewis or Kaldor approaches to the analysis of “supergrowth” (Kindleberger, 1967, especially chapter 2; Lewis, 1954; Kaldor, 1966). However, there is difficulty in applying this approach in Canada. From the end of the Second World War until the early 1970s, it might appear that Canada's economic development could be modelled in Kindleberger-Lewis terms. Thanks to the availability of immigrant labour in essentially unlimited quantity, and thanks to the falling relative cost of interna-

tional migration, the model would appear to have been as applicable in Canada as in Bangladesh. Yet for Canada, these were not decades of “supergrowth” — respectable performance, certainly, but not impressive in comparison with performances in Western Europe or Japan.

But labour is not homogeneous, and by treating it as such the Kindleberger-Lewis and Kaldor models indulge in the sort of oversimplification that is guaranteed to annoy the economic historian. It has become a professional tradition to comment on the differences among national educational systems, and among educational efforts, in a variety of contexts: examples include British economic retardation, Japanese supergrowth, the domestication of the industrial revolution first in France and then in Germany, and Russian and Soviet difficulties in coming to terms with urban industrial life. The tradition, it should be noted, is very different from the “human capital” approach that was fashionable among economists in the 1960s, and which almost inevitably is embedded in “sources of growth” analyses. What has interested historians is the supply-conditions for particular kinds of labour, and the precise formations, both general and technical, which each kind of labour has received. Where did the factory labour force come from? Was it literate? What skills and what attitudes did it possess, either at first or after some industrial experience? Was the supply of engineers in some sense sufficient to absorb and domesticate new technologies? Were there deficiencies — among mining engineers, chemists, or others? What sorts of work did engineers do, and were they employed effectively? What attitudes were inculcated by professional education of various sorts, by the general educational system, and by society at large?

Such questions are commonplace among the economic historians of Western Europe and Japan, although to my knowledge they have not been asked in Canada. Admittedly, it is hard to ask them in a way that will satisfy a careful professional economist, if that economist operates with models in which the concept of “enoughness” is meaningless because markets always clear, and in which substitutability solves all problems. But I think we must put up with some conceptual untidiness, here as well as elsewhere, lest we throw out the evidential baby with the conceptual bathwater.

Education

In Canada, at present and for many decades past, there has been a good deal of interest in the following question: can we design, or redesign, our educational system so as to improve the nation’s economic performance? The question has been of concern ever since the last quarter of the 19th century when it produced, first, a group of professional schools

of secondary and university level, and then a wave of “technical education” in the common schools. The concern continues, and it is one to which economists and historians can contribute, if we are willing to admit, at least in principle, that educational design is as important as the design of physical capital goods.

Fortunately, it does not seem necessary to linger over the question of education. Since 1945 the Canadian educational systems, largely under the stimulus of government, have innovated in a variety of ways, most of which appear to be accommodating with respect to the process of economic growth. Retention rates, both at secondary and at tertiary levels, have risen substantially. At all levels, professional and technical studies have expanded greatly. Although technical and vocational education have long histories in Canada, the development of such education since 1960 has been most dramatic. Also, there has been a proliferation of non-university tertiary educational channels, most of them directed toward career training. University post-graduate study and research, of which there was little before 1939, have both expanded considerably. Of course, many questions remain. Is there a sufficiently close link between research, product-development, and cost-reducing innovation and adaptation? Does engineering training, or management education, produce the desirable set of attitudes and skills? With respect to the output of specialists, do some bottlenecks remain, and if so, why? And so on. Such questions are asked not only in Canada but in the United States, the U.K., Japan, and many other industrialized countries. They are interesting, and it may be important to get the right answers. Still, it is hard to believe that the course of economic development since 1945 has been much deflected by any “wrongnesses” in the answer that the education system has actually produced, or that the retardation of the 1970s reflects any increase in what we might call the “coefficient of wrongness.”

Comparative Economic Historiography

Beyond the specifically Canadian economic historiography, there is what might be called the general sensibility of economic historians, especially those who are interested in problems of comparative economic development in the 20th century. Alfred Marshall chose as the motto for his *Principles of Economics*, “Natura non facit saltum.” Most economic historians, like most other economists, would presumably agree. Nevertheless, the record in the modern period is one of starts, stops, and reversals of position, especially with respect to comparative performance. Although the explicitly comparative literature is neither rich nor extensive, there is a considerable teaching tradition, and that tradition is relevant to our concerns here.

The 20th century is full of pauses and reversals, whether we examine

rates of growth or whether we are concerned chiefly with productivity. Canada, for example, began the century with a spectacular investment-propelled boom, and then saw nothing comparable until after 1940. During the 1920s, Germany was, in economic terms, the sick man of Europe, whether one considers productivity or examines output and unemployment. In output terms France did well in the late 1920s, then slipped into a slump that lasted a decade, continuing long after the United States had begun to recover, and long after the United Kingdom had fully recovered from the slump, pushing output, investment, and labour productivity to much higher levels than Britain had known in the late 1920s. It is reasonably clear that in the 1920s U.S. living standards rose more rapidly than those of any major European country. It is also clear that in terms of living standards the United Kingdom outperformed everyone during the 1930s, although for those who had jobs, the decade of the 1930s saw improvement even in North America, where output did not reach 1929 levels until after the outbreak of war — far later than in the U.K. These patterns gave rise, among other things, to Innis's observations on "economic cyclonics" (Neill, 1972, p. 37 ff.) and to an entire school that tried to explain France's poor economic performance in sociological and structural terms.⁸ Yet in the 1950s and 1960s, as is well known, Canada and the United States lagged behind the nations of continental Western Europe both in terms of growth and in terms of productivity performance, while the United Kingdom did so badly under both headings that in the early 1970s her economy seemed to be the sickest and most inflexible in all of Western Europe. In broad outline the patterns of the 1950s and 1960s were projected forward into the 1970s, although absolute levels of performance — inflation, unemployment, output growth, productivity growth — were worse in all the capitalist states. But the longer-term record shows that there was nothing immutable about the pattern of the period 1950–80, whether we are interested in comparative growth performance or in the behaviour of productivity.

In fact, if we examine the movement of living standards in Canada since Confederation, we find that there were periods of comparatively rapid advance, and periods in which things grew no better, or even worse. Furthermore, we find that the development in town and country were not synchronous, nor did things improve in all parts of the country at the same time, or at similar rates. On reflection, we should not be surprised about this fact. But the historical record does make one uneasy about the common assumptions of today: that people are entitled to see an improvement in their living standards every year, that all Canadians are entitled to more or less the same improvement, that regional disparities in living standards are unnatural, and that it is the business of government to make reality correspond to all the assumptions.

Of course, before 1939 there was little of what the economist of today would recognize as economic policy. Canadian governments did not

consciously manipulate taxing and spending to attain macroeconomic balance or any other large objective. At most, from time to time they undertook enormous developmental projects, whose macroeconomic impacts they blithely ignored. Nor could the nation have possessed a monetary policy in today's sense, lacking a central bank or any other self-conscious monetary authority until 1935. Before August 1914 and from 1926 until the winter of 1928–29 the country was rather unreflectively on the gold standard, and from 1879 it was self-consciously protectionist, while intermittently anxious to win tariff advantages — now from the United States, and now from the United Kingdom.

Would better, more self-conscious, or different economic policy have improved the nation's economic performance? Much of the literature on comparative economic performance in the post-1945 period assumes, explicitly or implicitly, that differences in policy account for differences in performance, both international and intertemporal. Maddison (1964, chaps. 2, 4) for instance, believes that Keynesian macro-management accounts for the general improvement in performance since before the Second World War, an argument that encounters the following interconnected objections.

Several of the most successful states, such as West Germany, France, and Italy, did not really practise the management of aggregate demand, while the United States, then one of the less successful, did not adopt the practice until the 1960s; Canada, which did so much earlier, performed only slightly better than the United States, while the United Kingdom, the most wholehearted practitioner of macroeconomic fine-tuning, did worse than any other large country — although somewhat better, in productivity terms, than before 1939. Similarly, the advocacy of incomes policies is oddly at variance with the historical record: during the 1970s, when such policies intermittently were fashionable, performance worsened, while in the 1950s and 1960s the countries that did best — West Germany, France, Italy, and Japan — were the countries that eschewed incomes policies.

As for trade, tariff, and exchange rate policy, all the industrialized states were committed under the General Agreement on Tariffs and Trade (GATT) to a liberalization of international trade, and so far as Europe was concerned the Organisation for European Economic Cooperation (OEEC) and Marshall Plan arrangements had the same effect with respect to non-tariff barriers; the exchange rates that first emerged from the postwar pegging of rates, and which were realigned in the late 1940s, did not reflect any particular macroeconomic policy imperatives; the rates of the immediate postwar years were essentially accidental, and realignments were meant to reduce or eliminate the “dollar gap,” not to attain any longer-run or more complicated outcome. The immediate result, in the early 1950s, was to leave the “dollar gap” in place, except for the United Kingdom; the longer-run result, once differences in

productivity performance began to assert themselves, was to give continental Europe and Japan a competitive advantage, while Britain gradually acquired a competitive disadvantage. Nor would it be plausible to argue that Canada's choice of regime or rate was the result of any long-run macroeconomic strategy.

This policy incoherence, naturally enough, has produced a plethora of prescriptions. Both in Canada and in Britain, it was being argued by the early 1960s that a deliberate devaluation of the currency should be introduced, so as to accelerate growth and improve the current account of the balance of payments. In Canada such a policy prescription was put forward on rather simple mercantilist grounds; in Britain the grounds were at first the same, although by the mid-1960s Nicholas Kaldor, among others, was devising more complicated justifications for the same prescription. Admittedly, deliberate undervaluation was inconsistent with the commitment that all the industrialized nations made when, in 1944, they subscribed to the Bretton Woods Agreement. Nevertheless, it increasingly came to seem a solution to the problem of the slowly growing countries: how best to improve not only the balance of payments on current account but the productivity performance?

Meanwhile, with respect to investment and investment ratios (gross domestic investment divided by GNP or GDP), certain patterns were emerging. In the first place, in all the First World countries investment ratios were higher after 1950 than they had been in the 1920s and 1930s; furthermore, where earlier data were available it appeared that these ratios were also higher than in the 19th or early 20th centuries. It was natural to suppose that these higher investment ratios had something to do with the improved productivity-performance that was so marked a feature of the years since 1950. Second, when inter-country comparisons were made, there was a rough correlation between high investment ratios and high rates of growth of GNP and of labour productivity. Closer analysis disclosed certain divergences: incremental capital-output ratios were quite different in the several countries, and it appeared that some states spent comparatively large amounts on comparatively low-yielding projects — housing, the capitalization of industries whose outputs were declining, projects of long gestation or long life in such fields as energy. Nevertheless, by 1960 it was plausible to argue that the high growth countries were high investment countries, although the presence of a comparatively high investment ratio did not guarantee a comparatively high rate of growth, whether one examined output or labour productivity.

Such observations quickly produced an attempt at more sophisticated measurements, by which one might explain the movement of total factor productivity, or account for the growth in output or productivity in more precise terms. Regrettably, it proved difficult to carry such exercises far back into the past, except in the United States, where the basic data were better than in most other countries, and in the United Kingdom,

where the data were worse. Studies of the “sources of growth” have thus been concentrated on the post-1945 years, insofar as they have attempted to make international comparisons. But the period since 1950 may well have been an atypical period in the longer-run economic history of the developed industrial world. First of all, for a variety of reasons, it marks the end of a 30-year period in which the international economy had been much disrupted, and in which the international movement of technical knowledge and ideas had been much less free than in the pre-1914 world, or in the post-1945 world. Second, the First World War and the Depression of the 1930s had created conditions in several European states that inhibited the adoption and domestication of technical progress. Third, both world wars had been far more destructive in Europe, and the Second World War had been far more destructive in Japan, than in the United States or Canada, which therefore enjoyed a pre-eminent position in economic matters that might well be eroded — and that was eroded — under the comparatively peaceful conditions of the 1950s and 1960s. Thus, for example, from 1913 to 1949, total factor productivity grew considerably more rapidly in the United States than in either France or the United Kingdom, and from 1913 to 1949 the Franco-British performances were identical (Carré, Dubois, and Malinvaud, 1976, Table 7.2). Yet in the 1950s and 1960s, France outgrew both of the Anglo-Saxon powers, while the United States outgrew the United Kingdom. This comparison serves to remind us about the extent of the reversals in relative positions and performance indices that have occurred in the 20th century.

Innovation

To the economic historian, such pauses, reversals, and changes in performance indices will be no surprise. The profession has long had a special interest in patterns of innovation, which, so far as the historical record can tell us, tend to come discontinuously and in groups. Insofar as innovation generates opportunities for new investment, insofar as it affects different territories in different ways, and insofar as it had positive effects on the movement of factor productivity and real earnings, the discontinuous and irregular course of innovation is bound to produce, at the very least, changes in indices of economic performance and, in more emphatic instances, pauses and reversals of position.

It is not in the nature of innovation to come smoothly or evenly, and the process of diffusion is not necessarily smooth. Nor is it reasonable to suppose, if one examines the historical record over much longer periods, that productivity and living standards will rise at the same rate, or in any regular fashion, year after year or decade after decade. The process, which has been elaborately studied not only by Schumpeter (1934; 1940, vol. 1, chaps. 1–3) but by many other scholars, is notable mostly for its

unpredictability. Every country, including Canada, has passed through “good years” and “bad years” in the past, not only with respect to unemployment and growth but with respect to productivity and living standards. Nor are the processes of invention, innovation, and diffusion under governmental control, although it is possible that government can encourage or discourage these processes. The last 14 years ought to have taught us that economic policy makers do not control the long-run evolution of the economy. Few economic historians, especially those who have been influenced by Schumpeter, ever thought that they did. With respect to the factors that influence productivity and living standards in the longer run, the role of macroeconomic policy may well prove to be no more than facilitating and accommodating — a matter of maintaining the conditions that enable business to develop and to apply what inventions are available.

In the third section of this report we shall see that one of the most striking characteristics of recent economic history is the emergence of a white-collar economy, and of a service economy. This phenomenon is not peculiar to Canada, but certainly is well-developed here. In that the larger part of the historiography of technological change has been concerned with blue-collar workers, with goods-producing industries, and with a rather small subset of the service-producing industries, especially with railways and canals, economic historiography may seem to have little to tell us about the situations of the recent past, and of the future. Some things, however, are known. It would appear that in the last half of the 19th century there was a wave of innovations — the typewriter, the telephone, carbon paper, the ticker tape, the long-distance cable — which presumably raised labour productivity in a wide range of white-collar occupations while requiring embodiment in a set of capital goods, many of which were not particularly costly.

These technological developments antedated the development of the large bureaucratic and corporate organizations with which we are familiar — organizations that might well have proved excessively cumbersome and costly without such developments in technology and capital formation. Thereafter, for almost a hundred years, there were no dramatic innovations with respect to office work. Indeed, changes in administrative practice, and increase in the scale of organization, combined to ensure that the number of white-collar personnel would increase more or less in step with the increase in the turnover of real goods and services. The result is observable both organizationally and in the intersectoral and interoccupational allocation of labour. The patterns, however, are not necessarily immutable. It is widely believed that another revolution in white-collar work is underway. Like the revolution in office work and in wholesaling and retailing of the late 19th century, the new revolution will require embodiment in new capital goods, especially electronics. Like the earlier revolution, it will require workers to learn new skills.

Although the effect on economic organization is difficult to predict, we may be reasonably sure that the new white-collar technology will raise labour productivity, and probably total factor productivity as well. However, the locus of that improvement, both industrially and occupationally, will presumably be different from the loci of the more striking improvements of the recent past. That is to say, labour will be saved in office work and perhaps in professional work, not only or chiefly in the production of goods.

As for the processes of invention and innovation themselves, these have been much studied, and certain regularities have appeared, although the microeconomic mechanisms are not always as clearly established as one would wish.⁹ Perhaps the most interesting conclusion is that both invention and innovation are sensitive to the level of aggregate demand and especially to the demand for capital goods, both current and expected. This is not to say that we have a simple economic explanation for major creative breakthroughs of the sort that profoundly change the economic structure. Nevertheless, it is likely that the economic environment of the 1950s and 1960s, unlike that of the 1920s and 1930s, was peculiarly conducive to invention and innovation; the 1970s, in turn, may perhaps prove to have been less so, although it is probably too early to be sure because there is inevitably some lag between invention and innovation, while the diffusion of new technology is never instantaneous.

The processes of invention and innovation are of special interest in Canadian economic historiography because it is generally agreed that Canada has benefited from the technological progress that has occurred abroad. It certainly does not appear that in the postwar period Canada's improved growth and productivity record is to be explained by the nation's rising level of outlays on research and development, compared with the decades before 1939. As for the question of developing our own technology, and the related policy question of an adequate flow of research and development activity, there is no particular reason to believe that Canada did become, or will become, more efficient simply by spending large quantities of real resources on research and development, or that an indigenous technology will be more efficient than imported technology, so long as we have the skill and will to adapt imported technology to local conditions. It must also be recalled that Canada is a small component of the industrialized world: we have some four percent of the First World's population. Obviously, therefore, the flow of invention from all First World sources will always be far larger than anything that we could possibly contrive for ourselves. Further, even if our own technology were to be more efficient — an untestable assumption — it would almost inevitably be focussed so narrowly on so small a component of the economic structure that it could not possibly have much leverage on productivity and living standards in the economy

as a whole. In this connection it is useful to recall the conclusion to which Denison-style growth accounting directs our attention: everything matters, but no one thing matters very much.¹⁰

Conclusions

To end our survey, we should remark on the tendency of some economic historians to suppose that efficiency does not matter as much as most other economists, or the general public, think. Partly because economic historians are interested in the movement of whole economies through time, and in the flow of innovation that increases general factor productivity and that often has the effect of creating new resources, they tend to emphasize the payoffs from that flow of innovations, and the waves of new investment that innovations generate, and to suppose that in comparison to the micro-wastages that reflect micro-misallocations of resources, innovations have large payoffs. Schumpeter, indeed, argued explicitly (1940; 1942) that the professional economist was wrong to worry so much about monopoly power and its allocational impact, because that monopoly power was both cause and effect of technological progress which, in turn, would eliminate monopoly positions in the course of time.

This professional tendency of economic historians may or may not be reasonable. But surely the experience since 1945 lends some support to it. In Canada, as in other countries, the student of micro-distortions can find some encouraging developments, and some discouraging ones, but it is not at all clear that there was any trend, or any reversal of trend. For instance, could one find some really large movement toward the elimination of distortions in the early postwar years, and some large contrary movement in the 1970s? And if one could find such a pattern, would it be enough to explain the comparatively good productivity performance of 1945–71 and the comparatively poor performance since 1971? Nor does it appear that the high-growth and high-productivity-growth economies of the 1950s and 1960s — Japan and the states of continental Western Europe — were significantly less distorted than other states or than they had once been. Indeed, it is interesting that in their study of French economic growth, Carré, Dubois, and Malinvaud emphasize the significant postwar contribution of some prewar phenomena, especially in education and in the development of industries with a future (1976, pp. 500–501), and that although they note with satisfaction the increase of geographical mobility in postwar France (*ibid.*, p. 502), they devote remarkably little attention to the presence or absence of distortions. Nor are they particularly interested in the efficiency impact of trade liberalization, although they note the positive effects. Canadian economic historians, of course, have long been interested in the effect of our own tariffs, but that interest has been at least as much in the long-run

developmental effects, if any, and in the impact on the ownership structure of Canadian manufacturing industry, as in the effects on the allocation of resources.¹¹

Although a fully developed economic history of the years since 1945 would have to take account of almost all the matters that have been mentioned in the present section, a simpler but still plausible narrative account can be constructed around a simpler set of categories — the growing labour force, growing export volumes, and strongly but irregularly expanding levels of investment, both in buildings and equipment and in inventories. The next few pages offer such a narrative.

Growth, Jobs, and Deceleration, 1945–81¹²

Growth

The economic performance of the years since 1945 has been impressive. Consumption, production, and employment have risen substantially, and until the mid-1970s living standards also rose, while even in the late 1970s the increase in employment came near to matching the increase in the labour force, so that unemployment levels, although always a matter for political and sectarian dispute, seem to have been tolerable. After all, if 8 percent of the labour force is without work — a typical figure for the late 1970s — it follows that 92 percent of the labour force is working.

Until the recession of the early 1980s, there were only three years in which output actually fell. These were 1945, 1946, and 1954; the decreases, furthermore, were very small indeed — 2.2 percent in 1945, 2.7 percent in 1946, and 1.2 percent in 1954. The declines of 1945 and 1946 reflect the sharp reductions in government current expenditure on goods and services, and in exports, which followed on the end of the Second World War; in both years, consumption and business fixed investment expanded considerably.¹³ As for 1954, business fixed investment fell by 1.9 percent, and government expenditure on goods and services declined by 2.1 percent while exports fell by 3.7 percent; consumption expenditures, however, rose by 3.7 percent, cushioning the contraction that appeared to be the result of a perfectly orthodox contraction in the autonomous components of aggregate demand, all of which were falling together. Real consumption rose in every postwar year except 1948, when it fell by 2.4 percent; even so, 1948 consumption was 154 percent of what it had been in 1940. The decline, in other words, was anything but catastrophic. Until the later 1970s, real consumption regularly outran the rapidly growing population, so that there was a strong upward trend in living standards. In 1944, measuring in 1971 dollars, the average income was \$2,486 per head, whereas in 1978 it was \$5,388. The average living standard had more than doubled in 34 years.

In three respects, however, economic performance became worse in

the 1970s. First of all, the inflation rate became much higher. In the course of the decade the GNP deflator doubled, a feat which had previously taken a quarter of a century to achieve. Second, unemployment tended to increase, both absolutely and in relation to the labour force, although it was only in the late 1970s that the peak levels of 1958–61 were surpassed. Third, living standards rose less rapidly, and then ceased to rise, even before the advent of the recession in 1981–82.

The economic expansion of the years since 1945 naturally was accompanied by a remarkable growth in employment. In 1945, only 4.4 million Canadians had civilian jobs; in 1981, the civilian labour force was 12.1 million, of whom 10.8 million were at work. Only in 1945, 1954, and 1958 did employment actually decline, but the declines were small in percentage terms — 0.8 percent, 0.3 percent, and 0.4 percent; furthermore, in every instance employment rebounded to still higher levels within a single year. The employment declines of 1945 and 1954 are generally taken to be the reflections of the output declines that we have already noted. As for 1958, one part of the explanation is usually taken to be the contraction in business fixed investment that occurred in that year, and another part presumably is the comparatively slow GNP growth of 1957 and 1958 taken together: output rose only 2.4 percent in 1957, and only 2.3 percent in 1958, so it is reasonable to suppose that higher labour productivity made so large a contribution to output that in 1958 some labour was not required, even though output was rising.

Unemployment

Development, of course, was anything but smooth. This fact provided fodder not only for politicians but for journalists, who could be trusted to speak of “recession” whenever the rate of growth declined or the rate of unemployment rose. Indeed, the most jolt-prone index was the rate of unemployment. Journalists and politicians were easily confused on this matter, often failing to recognize that because the labour force was growing so fast, it was arithmetically possible for the level and rate of unemployment to rise even when the number of employed workers was rising quite speedily. There was even a tendency, from time to time, to compare the absolute numbers of unemployed workers at various dates. Furthermore, it was not always easy to distinguish the several sorts of unemployment: people who have lost their jobs, people who have just entered the labour force, and people who are deliberately migrating between sectors and regions. By the early 1980s, indeed, there was a remarkable tendency to pretend that the unemployment of the late 1970s and early 1980s was somehow analogous to the unemployment of the early 1930s — a time when the labour force was growing slowly, when intersectoral migration had come to an end for the time being, and when immigration had been cut off by deliberate government action.

In 13 of the postwar years the number of unemployed actually fell and,

because the labour force grew larger every year, the unemployment rate naturally fell too. As an absolute magnitude unemployment fell in 1947, 1948, 1951, 1955–56, 1959, 1962, 1973, and 1979; as a percentage of the labour force, unemployment fell in every one of those years, and also in 1969 and 1974. But as an absolute magnitude, the number of unemployed rose in 1945–46, 1949–50, 1952–54, 1957–58, 1960–61, 1967–68, 1970–72, 1974–78, and 1980–81; as a fraction of the labour force, it also rose in all those years — except in 1972 and in 1974.

Ruminating on the movement of output, employment, and unemployment since 1945, one has a sense of a race between demand and supply.

Thanks to natural increase, changing participation rates, and very large immigration, every year there was a substantial increase in the number of people looking for work. Partly because of independent private decisions and partly because of government regulation, the flow of immigration tended to be relatively high in good times, and relatively low when unemployment rates were comparatively high, or were rising. The other components, however, tended to produce reasonably regular increases, year by year, even though the participation rates for certain groups are sometimes thought to have varied inversely with the general availability of jobs. Intersectoral shifts also might have been sensitive to the perceived availability of jobs outside agriculture. But to a considerable extent the contraction of agricultural employment was a long-run phenomenon. Further, insofar as that contraction was an out-migration of the self-employed, it presumably created a net addition to the pool of folk who wanted to work for wages in the economy as a whole. In agriculture the self-employed may be poor or miserable, but they can never be counted as unemployed. All in all, therefore, one has a strong upward trend in the size of the relevant labour force; in addition, it is likely that the rate of growth in that labour force will be higher when non-agricultural jobs are thought to be readily available, and lower when such jobs appear to be hard to find.

With respect to the demand for labour, on the other hand, there is a strong underlying trend toward labour saving, both because of technological change and because of capital accumulation, at least in certain sectors of the economy. Consumption and government current expenditure tend to rise monotonously, year by year. Although the introduction of new government programs may change either the level or the rate of increase of government expenditure on goods and services, sharp year-to-year fluctuations are extremely rare, except in rather special circumstances, such as the forced-draft re-armament program of the early 1950s, which first raised government expenditure on goods and services by 27 percent in two years (1951–53) and then reduced it by 2.1 percent in a single year (1953–54). Exports and business investment, however, do not grow at constant rates, and indeed from time to time they can and do decline.

It is possible to imagine economic systems in which the above per-

plexities need cause no problems. Real wage rates, techniques of production, participation rates, and patterns of intersectoral, interregional, and international migration can be imagined to adjust so speedily and so completely that there is no involuntary unemployment. If the actual world corresponded to this imagined world, it would be reasonable to argue either that there can never be a genuine unemployment problem — because those who have no jobs have chosen to be idle — or that unemployment reflects unnatural rigidities in the system — especially unionization, minimum wages and other aspects of wage structure, unemployment insurance, and other sorts of income support, all phenomena that prevent the system from adjusting properly.

I think there is a professional tendency among economic historians to deny that the real world does, or can, approximate the imagined one. This is partly because of a suspicion that the many “rigidities” reflect political, social, cultural, and even psychological realities, which cannot be willed out of existence at the wave of a neo-classical wand. It is partly because of a recognition that some of the rigidities, such as unemployment insurance, were deliberately introduced because the pre-existing and “more flexible” alternatives were widely believed to be unsatisfactory. It is partly because of a professional interest in the business of major investment projects and the uncontrollability of exports. It is partly because of a suspicion that, at least in the short run, neither factor proportions nor the choice of technology can possibly be as malleable as they would have to be in our imagined world.

This is not to commit oneself to a “fixed-proportions” view of the world. Nor is it to deny that the Canadian economy has become, in the relevant senses, more rigid since 1945. The unemployment insurance system, and other income-support programs, have become more generous and easier to use. Unionization has spread and, with the development of large corporate and public entities, it is probable that wage systems are now more bureaucratized than they were 40 years ago. Minimum wage legislation has become far more general. In Ontario, for instance, there was no general minimum wage for male workers until the 1950s, although since 1936 the Industrial Standards Act had fixed minimums for some men. More commodity prices are regulated — by marketing boards, by public sector enterprises, by large private corporations, by governments themselves, even by international cartels. If all these things had not happened, no doubt the measured level of unemployment would have been somewhat lower. However, it should be recalled that most of these developments are phenomena of the 1960s and especially of the 1970s. Yet even in the 1950s there was an upward trend in the unemployment rate, and there were uncomfortable fluctuations in that rate from year to year. It is hard to think of “new rigidities” that could have produced these fluctuations, or taken the unemployment rate from less than 2.5 percent of the labour force in 1951 to almost

7.5 percent in 1961. Nor can we find any “dissolution of rigidities” that accompanies the subsequent decline in that rate, to 3.6 percent of the labour force in 1966.

These considerations suggest that there is still some utility in a Keynesian approach, which looks with special attention at the components of aggregate demand, especially the autonomous ones — investment and exports — picking up government expenditure only when it shows signs of behaving in an autonomous way. In fact, we can construct a plausible narrative history of the years since 1945 by proceeding along these “textbook” Keynesian lines. This approach, of course, leaves unanswered the deeper question: why were exports and investment outlays doing what they were doing?

Exports and Investment

In the first great wave of expansion and development, which lasted from the end of the war to 1957, the main fuel was provided by business spending on new plant and equipment, and also by residential construction. The export trade was not particularly helpful. Having declined from the extremely high wartime levels, export volumes fell further in the late 1940s, declining 21 percent between 1944 and 1950. Recovery was then slow and unimpressive, in spite of the “Korean War boom” in the United States and in Western Europe. Exports did not pass the 1943–44 level until 1955. From 1954 until 1957, exports rose only 17 percent, and the overall increase since 1944 was only 6 percent. Meanwhile, national output had risen 64 percent. Obviously the expansion of these years was not export propelled; indeed, some exports, especially those of the Prairie wheat economy, were in deep trouble, partly because of British and European protectionism and partly because of U.S. subsidies. It was widely believed, however, that export prospects were good, at least in the longer run, because of the reduction in tariff levels that had followed from the first rounds of GATT bargaining, combined with a booming uranium market,¹⁴ and a suspicion that the United States was running out of various primary products, such as iron ore.

Meanwhile, the discovery of very large oil and gas reserves in Alberta prompted a wave of import-replacing domestic investment — no small matter, given that in 1945 Canada imported some 95 percent of the crude oil and refined products that it used. Alberta oil and gas development not only stimulated domestic investment but shifted the national import function. Some very large and “lumpy” investment projects, such as the St. Lawrence Seaway, the Kitimat aluminum smelter, and the iron ore developments in Labrador and Quebec, the long-distance oil and gas pipelines to British Columbia and Ontario, the first section of the Toronto subway, and the Ford automobile complex at Oakville, among many others, were constructed. The booming domestic market, mean-

while, presumably stimulated a variety of investment projects; although the Dominion had not committed itself to full employment, it was more or less committed to the maintenance of a “high and stable” level of employment, and it was visibly trying to use its fiscal system in a countercyclical and stabilizing way, thus presumably encouraging some of the faint-hearted among the business classes.

By 1953, new investment on plant and equipment was running at 253 percent above the depressed wartime levels of 1944. From 1954 until the peak year of 1957, business spending on this kind of fixed investment rose another 66 percent, so that compared with 1944 the increase had been 249 percent. Counting all sorts of business fixed investment, the increase between 1944 and 1957 amounted to 355 percent. Governments, meanwhile, were spending large and increasing sums on social infrastructure, and had even begun to spend a little on housing. Although business fixed investment was considerably larger, government fixed investment was growing faster: from 1944 to 1957, it increased 776 percent. Inventory accumulation, naturally, was far more variable from year to year. But in certain years, such as 1946–47, 1949–51, and 1954–56, additions to inventories provided considerable extra steam to the boom; in some other years, when inventory investment was falling or even, as in 1954, negative, it exerted a contractionary force.

The first great postwar boom thus appears to be a classic investment boom, even though part of that investment was related to long-run forecasts about the demand for Canada’s non-agricultural exports. Similarly, the deceleration of 1957–61 can be traced to a falling-away of investment. It also appears that the investment boom was broadly based; that is to say, it was not concentrated in any one sector or any small number of sectors. Some scholars (Caves and Holton, 1961) have suggested that the boom can nevertheless be interpreted in terms of Innis’s “staples thesis”; that is to say, as a boom that derives directly from the production of natural products for export markets. To argue in that fashion, however, one would have to show not only that there are strong linkages between export prospects, investment in the relevant export industries, and investment in other sectors, but also that there were no other strong forces encouraging investment in these other sectors. This amounts to arguing that the St. Lawrence Seaway, the TransCanada pipelines for oil and gas, the Ford plant at Oakville, and the Toronto subway were built because of investment at Kitimat and Schefferville. Although reasonable people may differ with respect to these linkages, many observers will find it hard to believe that the connections are as strong, or that other stimuli are as weak, as “staples theorists” would have us believe.

The great investment boom ended in 1957, a year of comparatively slow growth. For the next five years, output grew more slowly than it had been doing — 2.9 percent per year on average, as against 5.3 percent

per year from 1946 to 1956. Consumption, naturally, also grew more slowly, so that there were years in the late 1950s when living standards did not rise. Unemployment rates, as we have seen, rose quite strikingly, although they were still much lower than they had been in the late 1930s. At the time there was talk of recession, although such a label could hardly be proper when both output and employment were rising. It was suggested that the unemployment rate was rising because of automation and an accelerating pace of technological change — propositions that were hard to defend, given the fact that the level of employment was rising along with the level of unemployment. It was suggested that Canada's technical education system was defective, failing to produce enough skilled craftspeople. There was some criticism of the Conservative government, which had come to power in 1957; it was argued that a more expansionary fiscal policy would have been appropriate. Finally, there was much criticism of the Bank of Canada and of its governor, whose monetary policies appeared to be keeping credit uncomfortably tight, and the floating exchange rate inconveniently high.

In fact, the export-import situation was not particularly threatening during these years of slow growth. The import surplus diminished, from \$1.4 billion in current dollars in 1956 to \$0.7 billion in 1962, while as a proportion of GNP the import surplus went down from 4.4 percent in 1956 to 0.7 percent in 1962. The performance of exports, indeed, was quite respectable. Although export volumes did decline in 1958, they quickly revived, so that in 1961 they were a good 16 percent higher than they had been in 1957. Thanks in large part to uranium and wheat, this was a better record than the forties or early fifties. Some sorts of investment outlay were also increasing quite quickly. Government spending on construction and equipment rose by 35 percent, and house building, although it was said to be depressed on account of "high interest rates," rose 5 percent. The problem was private sector spending on non-residential structures, plant, and equipment. Such outlays went down in 1958, 1959, and 1960. Although there was some revival in 1961, even then the volume of such investment was 9 percent lower than in 1957.

Thus the slower growth and higher unemployment rates of the late 1950s can be viewed as the result of a slowdown in some sorts of investment outlay. The investment contraction was sufficiently great that total business fixed investment fell year by year, from 1957 through 1961. Inventory investment, furthermore, was not accommodating. The value of physical changes in inventories fell dramatically in 1957, became negative in 1958, recovered somewhat in 1959–60, and then slumped again in 1961.

The experience of the late 1950s does seem to cast some doubt upon the utility of "staples approaches" to economic growth and development in modern Canada. If domestic investment is basically export-derived and if export volumes are rising from year to year, why does investment

go down? Some explanations can be concocted. There may have been some building ahead of demand in the years before 1957; the late 1950s and early 1960s see the first large wheat purchases by Communist China and by the smaller communist states of Eastern Europe, and that sort of export growth, affecting as it did a wheat economy that had appeared to be unduly large, might be expected to induce rather less new investment than some other sorts of export growth; the uranium trade was *sui generis*. Such considerations might weaken the positive link between new exports and new investment. But it is hard to see how they could make new investment go down when exports are going up.

The late 1950s and early 1960s, furthermore, can quite improperly become a focus for political contention. The Liberals gave up power to the Conservatives in 1957, and did not regain it until 1963. The period of slow growth and comparatively high unemployment rates, therefore, is a period of Conservative government, which can all too readily be contrasted with the rather better economic performance of the preceding and succeeding “Liberal eras” — the years before 1957, and the period 1963–71 or thereabouts. But it would be quite wrong to allocate praise or blame in this way. The slowdown had already begun before the Conservatives took office in 1957; indeed, Conservative ministers were delighted to discover that the Liberals had known, while still in office, that a slowdown was underway. Thus the Conservatives inherited a retardation that they did not cause. In the same way, by 1962 there were already some favourable signs. Business fixed investment rose 4.5 per cent, and inventory accumulation tripled; exports went up by 3.9 per cent, while the amount and rate of unemployment were considerably lower than in 1961. There was further improvement in 1963. The Liberal government of 1963, therefore, inherited the beginnings of a boom, but it did not create that boom, the beginnings of which may be traced to the initial expansion of 1961–62.

In retrospect, the four-year slowdown of 1957–61 looks comfortably brief, and once the expansion which began in 1961–62 was launched, that expansion proceeded at an impressive pace for a very long time. Export volumes expanded almost continuously from 1961 through 1981. There was a slight decline in 1974 (2 per cent), and a more substantial decline in 1975 (6.4 per cent). These declines, however, were more than matched by the very substantial cumulative growth in other years. Rates of growth were especially high in the years 1962–70, 1973, 1976, and 1978; in 1973, the volume of exports was 279 per cent of what it had been in 1961, while by 1981 the figure stood at 359 per cent. The performance of fixed investment was somewhat less strong, rising by 1981 to 278 per cent of the 1961 level; business fixed investment tripled in volume over the same 20-year period. The growth of investment, furthermore, was rather more irregular than the advance of export volumes. Total fixed capital formation, and also business fixed capital formation, rose very rapidly indeed

between 1962 and 1966. But then the latter kind of spending declined slightly for two successive years, while total fixed investment increased very slowly. Thereafter, both investment figures declined in 1977 and in 1982, while growth was extremely slow in 1970 and 1978; other years experienced substantial year-to-year variation in rates of growth. Inventory investment, in turn, proved to be very volatile, recording substantial declines in 1967, 1970, 1975, 1977, and 1980, and smaller declines in 1964, 1966, and 1978. In 1982, of course, inventory investment, fixed investment, and exports all turned decisively downward, signalling the onset of the first general recession since the 1930s. In other years, declines in one category were generally offset, or more than offset, by increases in others; the only exceptions were 1975 and 1980. In 1975, both exports and inventories fell together, while the advance in fixed investment was not particularly strong; in 1980 both exports and fixed investment were rising, but their combined increase was only 75 percent of the decrease in inventory investment.

The unemployment percentage tracked investment and export demand in the expected way. From 1961 to 1966, when both export demand and investment demand were strong and rising rapidly, the unemployment rate fell: in 1966, it averaged 3.4 percent. The economy was outgrowing its labour force, whose size was of course expanding quite rapidly, both because of immigration and because of natural increase, of which the rate was very much higher in the 1960s and 1970s than in the 1950s. The new workers of the 1950s had been the babies of the 1930s, when birth rates touched historic lows; with the rise in birth rates that began early in the 1940s, a more rapid growth in the labour force could be predicted with certainty for the 1960s, although the onset of the new wave would be delayed, and its height diminished, by the rising retention rate in secondary and tertiary education. But as investment demand faltered in 1967, the economy was no longer growing fast enough to absorb its extra workers, so that although GNP and total employment were still rising perceptibly, the number and proportion of unemployed workers were rising too. When investment demand temporarily revived in 1969, the unemployment rate conveniently fell, although the number of unemployed rose a little. But with inventory disinvestment and sharp reduction in the growth rate of fixed investment in 1970, the unemployment rate rose to 5.7 percent, even though total employment rose slightly as well.

Thereafter the story was complicated by the fact that the labour force was growing far more rapidly than at any time between 1940 and 1971. Between 1969 and 1983, the increase was almost 50 percent. From 1970 to 1981 the labour force grew by 3.5 million; in the next two years it would add almost another 300,000. Employment, meanwhile, increased by “only” 3.1 million from 1970 to 1981. In most periods, such an increase would have been regarded as a considerable achievement; one way to

see this fact is to say that the economy found jobs for 88 percent of its extra labour. However, in that the “other 12 percent” were unemployed, the overall unemployment rate drifted irregularly upward, reaching 7.5 percent of the labour force in 1981.

That increase was not uninterrupted. Thanks to the expansion of exports, domestic fixed investment and inventories in 1973, the unemployment rate fell to 5.5 percent. In 1974 export volumes declined, but both fixed and inventory investment expanded strongly, so that the unemployment rate again fell, to 5.3 percent. Indeed, the number of unemployed fell by 38,000 persons in 1973 and by another 1,000 persons (annual average) in 1974. In 1975, however, both export volumes and inventory investment were so weak that they swamped the modest increase in fixed investment; although employment rose a little, the unemployment rate rose also, to 5.9 percent. Again in 1976 the rate rose, in spite of strong upward pressure from exports and from investment; total employment rose by almost 200,000, but the labour force was increasing faster still, so that the unemployment rate rose to 7.1 percent. In 1977, there were strong contractionary forces from inventory investment, and modest ones from fixed investment, but the export expansion offset these; employment increased, but so did unemployment and the unemployment rate. The story was repeated for 1978. In 1979, there were again strong expansionary forces from fixed investment and exports; thus the unemployment rate fell from 8.3 to 7.4 percent. In 1980, inventory investment turned downward but both exports and fixed investment rose somewhat; in 1981, all three “autonomous components” rose perceptibly. Thus in 1980–81, the unemployment rate was 7.5 percent — the same figure that had been reached in 1961.

Consumption and Demand

Thus far we have been concentrating our attention on exports and on investment, partly because both series show large year-to-year variations and partly because their movements appear to correlate plausibly with the movements of unemployment and with the general performance of the economy. In so doing, we do not mean to imply that we can ignore the movements in household consumption and in government current expenditure on goods and services. To give a full account of year-to-year changes in the pressure of demand, along lines that budget speeches and annual economic surveys have generally adopted, we would have to consider both. Nevertheless, it has been usual to suppose that the movements of consumption are induced in large part by other movements — especially by the movement of national income and personal disposable income. Similarly, government current expenditure ought to be a more or less mechanical reflection of government programs, changing direction only when there are really dramatic alterations in these

programs, and drifting upward in the longer run as population and revenues both expand. In a general way, the record since 1945 is broadly consistent with these expectations. In every year except 1948, real consumption rose; similarly, once the rundown from the war had been completed in 1948, real government current expenditure on goods and services began an increase that continued in almost every subsequent year, being interrupted only in 1954, 1957, and 1959. Most of the time, therefore, consumption and government current expenditure were supplying an expansionary pressure. From 1947 through 1979, real consumption rose at an average rate of 4.9 percent per year, and real government current expenditure on goods and services rose by 5.5 percent per year.

Real consumption, however, did not grow at a constant rate, or at anything like a constant rate. Nor did additional consumption stand in any simple relationship to additional GNP or additional personal disposable income. In 1951, 1954, 1957–58, 1960–63, 1966–67, 1969–70, and 1977–79, real consumption grew at much below its average rate of growth — sometimes, as in 1951, 1961, and 1977–79, at very much lower rates. Similarly, although on the average almost 60 percent of additional GNP went to personal consumption, the figure was below 50 percent in 1951, 1952, 1961, 1962, 1963 and 1966, so that in all those years an unexpectedly low level of personal consumption would have exerted less expansionary pressure than “normal.” Conversely, in 1949, 1953, 1954, 1958–60, 1967, and 1974–77, the figure was above 70 percent — sometimes very much above 70 percent — so that important and unusual expansionary forces could be traced to the movements of household consumption.

As for real government current expenditure on goods and services, this element in demand grew even more irregularly than household consumption. Positive rates of growth could be as high as 11 percent in 1949, 30 percent in 1951, and 18.1 percent in 1952, when, in the latter two years, rearmament was well under way; for less obvious reasons the growth rate could reach 14 percent in 1961, 9 percent in 1966, and 10 percent in 1970. In times of restraint, however, very much lower growth rates are recorded — 1.5 percent in 1963, and an average of 1.65 percent per annum in 1976–79. On the average, 22.4 percent of additional GNP went into this sort of expenditure, and in 1977 the actual figure precisely equalled this average. But for 1976 and 1978–79 the figure was well under 6 percent, and in 1955–56 it had been smaller still, while in 1951 it rose to 97 percent.

The “marginal propensity to spend currently on government services” was thus anything but stable. At a certain level of generality, the explanation is obvious enough. Established programs possess a certain momentum, such that outlays do not and cannot vary with GNP in any simple way; new revenues and new programs need not and did not march

conveniently hand in hand. For a more detailed explanation one would have to look closely at taxing, spending, and program design, not only in Ottawa but in the ten provincial capitals, whose spending became steadily more important in relation to Ottawa's, and in the thousands of town halls from Whitehorse to St. John's.

The above data also show us that, in relation to the whole economy or to private consumption, government current expenditures on goods and services have grown in a most irregular way. Private consumption grew faster in 1954–60, 1961–65, 1969, and after 1970; indeed, as we noticed above, in the later 1970s this kind of government spending was absorbing very small proportions of extra GNP — almost as little as in such “low-growth” years as 1955 and 1956. These observations should also remind us that there is no simple relationship between economic well-being and “big government.” In the later 1970s, when government current expenditure on goods and services was really quite well controlled, most people thought the economy was doing badly; in 1955–57, when the same thing could be said, most people thought things were going very well; in 1958–59, when this kind of government spending first grew slowly and then fell, there was widespread talk of “recession.”

Demand and Unemployment

So far as aggregate demand and unemployment are concerned, it now appears that the story of the late 1970s is not unlike the story of the late 1950s. In both periods the economy was growing, and so was the labour force; in neither period was the growth of the former sufficient to absorb the growth of the latter. In both periods, furthermore, there were years in which per capita real income did not increase. There were, however, important differences. In the goods-producing industries and in the commercial service-producing industries, the underlying growth of labour productivity was considerably higher in the 1950s and 1960s than in the 1970s. Furthermore, in the 1950s the economy was applying its extra labour in very different ways than in the 1970s. We shall develop this theme at length in the next section.

Labour productivity, of course, is a very imperfect measure of the efficiency performance of the economy, since in principle an increase in labour productivity might simply reflect an increase in the utilization of other inputs. Ideally one would like to measure total factor input, weighting the inputs appropriately and adjusting crude measures of such inputs as labour to take account of such things as changing levels of education, age structure, and sex structure within the labour force. It might also be possible to estimate the numerical significance of such things as inter-industry shifts of labour, economies of scale, the payoff from balancing the capital stock, and so on, so as to calculate a “residual” growth of productivity that is not explained by anything one

can think of — or at least, not by anything whose impact the analyst is willing to try to measure. The approach, which is sometimes called “accounting for growth,” “sources-of-growth,” or simply “growth-accounting,” has been applied by many analysts, especially in the United States, but also in Western Europe and Japan, since the early 1950s.

GROWTH-ACCOUNTING

The growth-accounting approach is best exemplified in the many writings of E. F. Denison. The most recent of these works examined the U.S. productivity slowdown of the mid-seventies (Denison, 1979). The methodology in this study is essentially the same as in earlier works: one first measures the increase of input, adjusting labour input for such things as changing educational levels, age and sex composition, and for changes in annual hours of work; one then writes down everything else that one can think of, estimates the growth contribution of each such item, and deducts the results from the growth of output per unit of input, so as to derive a “residual,” a measure which Denison calls “advances in knowledge and miscellaneous.” For the period 1973–76, Denison finds that in U.S. non-residential business the output per unit of input declined, while the other considerations had only a small positive effect, so that the “residual” was negative — a finding that implies, in Denison’s usual conceptual framework, that knowledge is retrogressing. The considerations for which Denison estimates impacts are: gains in the allocation of resources through the shrinkage of farming and of inefficient non-farm self-employment; effects of changes in the legal and human environment under the headings of pollution abatement, employee safety and health, and dishonesty and crime; effects of weather on farm output; changes in the intensity of resource utilization, including work stoppages and changes in the intensity of final demand (see in particular Denison, Table 5-3).

Denison’s findings (Table 8-3) show a tendency, evident since 1948, for the growth of national income per person employed, or NIPE, to decline from period to period. Thus in the period 1948–53 the annual growth rate of NIPE was 2.6 percent, while in 1969–73 it was 1.5 percent, and in 1973–76, 0.22 percent. These observations suggest that something systemic may have been at work. What might that thing be? Here Denison is less than helpful (Denison, 1979, chap. 9). He does not think that retardation in R&D expenditure can bear much, or any, of the blame. While admitting that there may have been a “decline in opportunity for major new advances,” he does not think that any such development could have put on the brake quite so fast. He is skeptical about “decline of Yankee ingenuity,” the aging of the capital stock, elements of government regulation and taxation not included in his numerical estimates, new paper-

work imposed by government, delays of new projects caused by regulation, regulation-induced misallocation of resources, “the effect of high tax rates on incentives and efficiency,” the Bacon-Eltis thesis (1978) with respect to the burden of the public sector, heavier taxation of capital gains, the possibility that people are working less hard, the impact of inflation on efficiency, lessening of competitive pressure, changes in the quality of management, the rise in energy prices, errors of measurement, and the shift to the service industries. While admitting that some of these suggestions have merit and that it is possible that everything went wrong all at once, he can do little more than to propose more intensive research on each of these suggestions, concluding that the performance of 1973–76 is a mystery: “I do not know why the record suddenly turned so bad after 1973” (Denison, 1979, p. 122).

During the 1960s, when growth-accounting was fashionable, there were several Denison-like studies of Canadian growth. An early example was Domar et al. (1964). Wilkinson (1965) examined the contribution of education to economic growth, and Wilson and Lithwick, in two studies for the Carter Commission, largely replicated Denison’s calculations for Canada (Lithwick, 1970; Wilson and Lithwick, 1968). Dorothy Walters, in two Economic Council studies (1968; 1970), performed a similar exercise. Assumptions and implicit production functions, naturally enough, differed from study to study. Nevertheless, the general pattern is reasonably clear: in Canada, output per unit of input appears to have been rising somewhat more rapidly than in the United States, but considerably less rapidly than in Western Europe or in Japan. In some of these studies, furthermore, it appeared that the contribution of education might have been somewhat lower in Canada than in the United States, and that there might have been problems about the level of managerial expertise. Such implications were more than hinted at in the Walters studies, which showed that the identifiable contributions from such things as economies of scale were not unimpressive, so that the problems all lay with the “residual” — the essentially unexplained element in productivity growth.

In the 1970s growth-accounting became much less fashionable. Nevertheless, in Canada there were further such calculations, more sophisticated but of a similar kind. Thus for manufacturing, in 1979 May and Denny showed that total factor productivity rose at an average annual rate of 0.932 percent per annum from 1949 through 1976, but that after 1971 the rate was only 0.43 percent per annum, as against 1.5 to 1.9 percent per annum from 1949 to 1971.

Deceleration

It should always be remembered that the “productivity failure” of the 1970s is not peculiar to Canada.¹⁵ Throughout the industrialized world,

rates of productivity growth were lower in the 1970s than in earlier decades, although the extent and the completeness of the retardation differed from country to country. OECD reportage amply documents the generality of the change, although the reportage is seldom technically very sophisticated. Boltho (1982, pp. 22–23) reports trends in GDP per employed person for the several Organisation for Economic Co-operation and Development states in Europe, and for the European OECD as a whole. Output per employee rose 4.1 percent per year in the 1950s, 4.3 percent per year in the period 1961–67, and 2.3 percent per year in the years 1973–79. The change is a perfectly general one, affecting all the OECD countries in Europe, although not to the same extent. Thus in Italy, labour productivity on this definition was growing by 5.6 percent per year before 1973 and after 1973 by only 1.5 percent, while for the United Kingdom, one of the more feeble performers in the 1950s and 1960s, the figures are 2.9 percent per year and 1.2 percent per year. Investment ratios, meanwhile, also declined, but not by very much: in the 1960s the European OECD countries were accumulating 23.7 percent of their GDPs as gross fixed investments, while in 1974–79 the proportion was still 21.5 percent — substantially higher than it had been in the 1950s. This pattern also is a perfectly general one, except for Norway, where the investment ratio rose slightly after 1973.

In a macroeconomic sense, Canada's troubles of the mid-1970s and late 1970s, so far as employment is concerned, might well be traced to the level of fixed investment, even though, except in 1977–78, the level of that investment rose considerably, year after year. Putting matters that way, one is assuming that there was enough slack in the economy to accommodate higher levels of investment if the business community had wanted to invest more. With respect to slack, opinions are bound to differ, and the inflationary pressure of those years certainly suggests that, whatever was causing the inflation, higher investment would probably have been accompanied by a still higher rate of price increase. These assessments, in turn, depend partly on what one believes to have been the situation with respect to the natural rate of unemployment. In saying that the troubles of the late 1970s can to some extent be treated as a failure of domestic investment, we do not imply that simply by means of investment one could have propelled the economy back to the very low unemployment ratios of the period 1945–56, or even to the ratios of the mid-1960s, at least without adding unacceptably to the inflation rate. It seems to be generally believed that during the 1970s the natural rate of unemployment, or the rate that could be sustained without creating inflationary pressures, must have risen. There is, however, not much agreement about the extent of that increase, although many studies of the topic have been undertaken.¹⁶ But it is reasonable to suppose that higher investment, especially in the goods-producing industries, would have implied not only higher employment but a more rapid growth of

labour productivity, in that a larger quantum of best-practice capital goods would have been accumulated, while in some industries higher utilization would have implied higher productivity, not only for labour but for other inputs as well. Furthermore, some irreversible Kaldorean scale effects might have appeared in some goods-producing industries, further improving productivity performance as measured. Both employment performance and productivity performances, therefore, might well have been better. But one must not conclude that the government of the day, or its advisors, should have encouraged still more investment: given the inflationary pressures of the period, and given the uncertainty about the work skills of the young workers and female workers who made up so much of the additional work force, more investment would almost certainly have involved an inflationary risk, which prudent officials and politicians might properly have wanted to avoid.

Workers, Industries, and Occupations

This section has two principal components. First, we survey labour force developments in Canada since 1945 and, in some respects, since earlier dates. It is shown that in Canada, as in other OECD countries, the postwar decades have shown a dramatic contraction of agricultural employment, both absolute and proportional, together with an expansion of service employment and white-collar employment so dramatic as almost to justify the labelling of the First World as a “Service World.” Second, in the latter pages of the section and in the following section we examine some of the resultant implications. It is suggested that when an economy uses labour as Canada now does, it may find productivity increase comparatively hard to attain; conversely, it is suggested that some large global models of industrial slowdown that derive their force from these changing labour patterns have little applicability to Canada.

Labour Force Developments, Post-1945

Table 1-1 presents census information about the distribution of the labour force among industries. Labour force survey data for 1946 are also included. The data are grouped into primary, secondary and tertiary industrial sectors. The primary sector contains agriculture, forestry, fishing, trapping, and mining; the secondary industrial sector consists of manufacturing, transport, construction, and public utilities; the tertiary sector contains the remainder, that is to say wholesale and retail trade, finance, insurance, real estate (FIRE), community, business, and personal service (CBP), and public administration and defence (PAD). In the data for 1941, the 316,000 men and women who were on active service are distributed among the several industries on the basis of their last industrial activity, so that there are no military personnel in the 1941 figures.

TABLE 1-1 Labour Force — Industrial Distribution

	1941 ^a	1946	1951	1971	1981			
	(thousands)							
Total	4,511	4,663	5,288	8,626	12,054			
Agriculture	1,122	1,186	827	482	487			
Forestry	100		130	74	103			
Fish, trapping	53	185	51	25	38			
Mines	100		104	139	216			
Primary	1,375	1,371	1,112	720	844			
Manufacturing	1,025	1,214	1,361	1,707	2,279			
Construction	236	224	351	538	767			
Transport, etc.	212	373	465	671	961			
Secondary	1,473	1,811	2,177	2,916	4,007			
Trade	497	573	710	1,269	2,004			
FIRE	97	124	144	358	636			
Service (CBP)	674	784	773	2,041	3,478			
PAD	149 ^b	—	304	640	908			
Tertiary	1,417	1,481	1,931	4,308	7,026			
Unassigned	246		68	682	177			
Increases								
	1941-51		1951-71		1971-81		1946-81	
	No.	%	No.	%	No.	%	No.	%
	(thou- sands)		(thou- sands)		(thou- sands)		(thou- sands)	
Not assigned	- 178	-22.9	614	18.4	- 505	-14.7	177	2.4
Primary	- 263	-33.8	- 392	-11.7	124	3.6	- 527	-7.1
Secondary	704	90.6	739	22.1	1,091	31.8	2196	29.7
Tertiary	514	66.2	2,377	71.1	2,718	79.3	5545	75.0
Total	777	100.1	3,338	99.9	3,428	100.0	7,391	100.0
Agriculture	- 295	-38.0	- 345	-10.3	5	0.1	- 699	-9.5
Manufacturing	336	43.2	346	10.4	572	16.7	1,066	14.4
PAD	155	19.9	336	10.1	268	7.8	n.a.	n.a
Fed. non-defined	27	3.5	82	2.5	73	2.1	n.a.	n.a
CBP Services	99	12.7	1,268	38.0	1,437	41.9	n.a.	n.a
PAD & CBP	254	32.7	1,604	48.1	1,705	49.7	3,602	48.7

Source: Statistics Canada, *Census Bulletin* (Ottawa: Statistics Canada various years).

a. Including those on active service.

b. Excluding members of Armed Forces — 316,000 — distributed.

There is also an “unassigned” category, the size of which fluctuated irregularly. The lower part of the table presents the changes between one year and another, both in absolute and in percentage terms, and it also presents information on four industries that are likely to be of special interest.

It is at once apparent that the tertiary sector has provided the lion’s share of the new jobs — 75 percent from 1946 to 1981. Furthermore, its

contribution has tended to increase from decade to decade. This development does not reflect some sort of elephantiasis of the public sector, at least so far as administration is concerned. The federal non-defence sector has provided a modest and declining proportion of the new jobs, and although the other levels of government have expanded their employments far more speedily than the federal government, “public administration and defence” or PAD, since 1951 has provided some 8 to 10 percent of the new jobs. However, within the category of “community, business and personal” (CBP) services, which has provided more new jobs than any other activity, especially in the 1970s, are many activities that government subsidizes or wholly finances — in particular, the educational and health systems. Adding PAD and CBP services, we find that since 1946 almost half of all the new jobs were created in these two components of the tertiary sector.

This is the sort of long-run structural reorganization of the labour force to which Clark (1940) drew our attention almost half a century ago, and which is at the centre of various more recent stylized histories, as we shall see in the next section. It has been a perfectly general one, affecting all the OECD countries, as Table 1-2 reveals. Since 1967, in the OECD as a whole, the share of agricultural employment has fallen from 16 to 10 percent, while the share of manufacturing has also fallen a little, and the share of “other activities,” chiefly service industries, has risen from 47.2 to 56.3 percent. With respect to the weight of the service sector in total employment, Canada and the United States are still neck and neck, well in front of the OECD as a whole, by much the same margin in 1980 as in 1967.

Denison (1973) thinks that little interest attaches to the relative growth of the service sector. He maintains, first of all, that within the non-farm non-residential business sector of the United States there has, in fact, been no shift toward services. He also notes that both goods-producing and service-producing industries “contain industries of fast and slow productivity growth” (1979, p. 143), and he observes that rates of productivity growth are not constant within or among industries; these rates, he says, “rise and fall.”

There are several problems about this Denisonian dismissiveness. First of all, Denison is explicitly concerned with the “non-residential business economy,” a category that does not include the whole economy, or all service industries. In 1971, the most nearly comparable Canadian category received 45 percent of the weight in the aggregate index of real domestic product. The “commercial service-producing industries,” which are included in Denison’s definition, and for which we have official Canadian data, consistently record a slower growth of labour productivity than the goods-producing industries (Leacy, 1983, F246, F255, F281 and F290). That this pattern might change is a possibility, but one which should be entertained only if some evidence or

TABLE 1-2: Distribution of Civilian Employment (OECD), Percentages of Total

	1967	1970	1980
Agriculture			
Canada	8.9	7.6	5.5
United States	5.3	4.5	3.6
Japan	21.1	17.4	10.4
OECD Europe	20.4	18.1	14.5
United Kingdom	3.6	3.2	2.7
All OECD	16.0	13.8	10.0
Industry			
Canada	32.4	30.9	28.5
United States	35.8	34.4	30.5
Japan	33.8	35.7	35.3
OECD Europe	38.5	39.1	35.7
United Kingdom	45.6	44.8	38.1
All OECD	36.8	37.0	33.7
Other Activities			
Canada	58.7	61.4	66.0
United States	58.9	61.1	65.9
Japan	45.1	46.9	54.2
OECD Europe	41.1	42.8	49.8
United Kingdom	50.8	52.0	59.2
All OECD	47.2	49.2	56.3

Source: Organisation for Economic Co-operation and Development, *Labour Force Statistics* (Paris: OECD, annual publication).

argument is presented. Whether we look at output or at employment, from 1946 to 1976 the commercial service-producing industries grew more than the whole economy, and more rapidly than the commercial goods-producing industries (Ibid., F225, F239, F241, F250, F277). Within the commercial service-producing industries, a very heterogeneous category, there are some activities, such as financial service, where one might imagine that the current electronic revolution will raise labour productivity at more rapid rates in future; there are other activities, such as medical and dental care, where it is harder to be optimistic about the possibilities.

In terms of labour absorption, the performance of Canada's secondary sector was strikingly strong, even in the 1970s. Under this heading the Canadian performance was very much better than the European, as we can see from Table 1-3. But from 1941 to 1971, the growth of manufacturing barely matched the contraction of agriculture; it was the expansion of transportation, storage, communication, and construction that absorbed so many workers in the secondary sector. In the 1970s the primary sector was no longer contracting, so that the expansion of the secondary sector was not offset by contraction elsewhere. Furthermore,

TABLE 1-3 Employment by Major Sector

	1970-74	1974-78	1979	1980	1981
Annual Percentage Changes					
Total Economy					
Austria	1.2	0.3	0.2	0.2	0.5
France	0.7	0.2	0.1	0.3	-0.9
Federal Republic of Germany	-0.4	-0.9	1.4	0.9	-0.9
Italy	0.3	0.6	0.9	0.9	1.0
Sweden	0.6	0.7	9.5	1.1	0.4
United Kingdom	0.3	-0.1	0.7	-1.7	-5.4
Canada	3.8	2.3	3.9	2.8	3.1
United States	2.3	2.5	2.7	0.3	1.3
Agriculture					
Austria	-4.6	-3.6	-3.5	-1.0	n.a.
France	-4.9	-3.0	-1.5	-1.4	n.a.
Federal Republic of Germany	-4.2	-3.6	-3.1	-2.6	-2.3
Italy	-3.0	-2.0	-2.7	-2.8	-4.6
Sweden	-4.2	-2.6	-2.3	-2.4	-2.2
United Kingdom	-3.2	-1.2	-2.3	0.6	-1.7
Canada	-1.9	-0.2	2.1	-1.2	1.5
United States	0.2	-1.1	-1.4	0.4	0.5
Manufacturing					
Austria	1.4	-0.9	-0.6	0.9	-2.0
France	1.2	-1.4	-1.7	-1.4	-3.3
Federal Republic of Germany	-1.2	-2.0	0.8	0.8	-1.8
Italy	0.7	-0.2	0.3	0.6	n.a.
Sweden	-0.3	-1.4	0.2	-0.1	-2.3
United Kingdom	-1.0	-1.9	-1.3	-4.6	-10.9
Canada	3.0	-0.3	5.8	1.7	2.6
United States	0.9	0.5	2.6	3.5	—
Enterprise Sector (Excluding Agriculture and Manufacturing)					
Austria	2.0	1.2	0.9	-0.6	n.a.
France	1.6	1.4	1.3	1.3	n.a.
Federal Republic of Germany	—	-0.3	2.0	1.2	n.a.
Italy	0.3	1.3	2.3	2.1	n.a.
Sweden	-0.3	—	0.6	0.2	0.5
United Kingdom	0.7	0.4	1.7	-0.4	-4.3
Canada	4.4	3.3	4.1	3.0	3.8
United States	2.9	3.5	3.3	1.3	n.a.

TABLE 1-3 (cont'd)

	1970-74	1974-78	1979	1980	1981
Annual Percentage Changes					
General Government					
Austria	4.3	3.4	1.9	2.0	n.a.
France	2.5	1.9	0.2	0.6	n.a.
Federal Republic of Germany	3.9	1.5	2.7	1.6	n.a.
Italy	5.1	3.0	1.4	1.4	n.a.
Sweden	5.8	5.1	4.5	4.0	2.7
United Kingdom	3.0	2.2	1.6	-0.7	-0.7
Canada (PAD only)	6.4	2.5	-0.7	5.9	-1.0
United States	3.2	2.7	1.8	1.9	n.a.

Source: UN Economic Commission for Europe, *Economic Survey of Europe 1981*, Table 1.1.16.

—: No changes.

n.a.: Not included in source.

in all the secondary sector, because of the rapid expansion of jobs in manufacturing, more jobs were created in the 1970s than in the preceding 20 years. However, the dramatic increase in tertiary sector employment absorbed very large numbers of people all the time, except perhaps in the late 1940s. In the 1970s, when the labour force was growing fast, almost 80 percent of the new jobs were in the tertiary sector. Thus, insofar as government arrangements for taxing, spending and borrowing had the effect of re-circulating household income and increasing the demand for tertiary sector jobs, those arrangements played an important role. Conversely, if the demand for commodities and for marketed services had grown more rapidly during the 1970s, there would presumably have been more employment in the primary and secondary sectors, and in trade, finance, insurance, and real estate, but little or no extra employment in the other service industries, except insofar as buoyant government revenues led to a more generous provision of the relevant public services.

In the classical literature on structural change in the labour force, it is usual to focus on the industrial structure, as we have been doing in the preceding paragraphs. However, it may also be useful to consider the occupational structure, if only because our “stylized facts” (what some economists call rough approximations of reality) with respect to the possibility of productivity change seem more applicable to occupations than to industries. Admittedly, in a few instances industrial data may be an acceptable proxy. For instance, in 1971, more than 90 percent of all workers in finance, insurance, real estate, and non-governmental service industries were white-collar workers, while in construction the figure was 13.5 percent. Nevertheless, in many industrial sectors the

TABLE 1-4 Canada: Work Force — Occupational Distribution

	1941	1951	1961	1971	1981
All Occupations	4,196	5,222	6,296	8,813	12,167
Total white-collar	1,024(24%)	1,659(32%)	2,414(38%)	4,623(52%)	7,382(61%)
Owners & managers	227	423	540	372	814
Professionals	279	380	629	2,065 ^a	3,231 ^a
Clerical, sales	518	856	1,245	2,186	3,337
Total blue-collar	3,172(76%)	3,563(68%)	3,882(62%)	4,190 ^b (47%)	4,785 ^b (39%)
Farmers, farm workers	1,081	829	648	512	509
Operatives	1,825	2,383	2,929	3,678 ^b	4,276 ^b
Labourers	266	351	315	—	—
Changes in Distribution					
	1941-51	1951-61	1961-71	1971-81	1941-81
Total white-collar	635	755	2,209	2,759	6,358
Owners & managers	196	117	-168	442	587
Professionals	101	249	1,436	1,166	2,952
Clerical, sales	338	389	941	1,151	2,819
Farmers, farm workers	-252	-181	-136	-3	-572
Operatives, labourers ^a	643	510	434	598	2,185

Source: Statistics Canada, 1941, 1951, 1961: *Historical Statistics of Canada*, 2d ed., Series D86, 89, 92, 95, 98, 101, 104, 1971 and 1981: *1981 Census Bulletin* 92-920, Vol. 1, Table 1. Ottawa: Statistics Canada.

a. Includes professional, technical, artistic, literary, recreational.

b. Includes occupations not stated and occupations not elsewhere classified.

picture is a much more mixed one, and with the advance of white-collar work it may have become still more mixed, especially in the last decade.

Table 1-4 summarizes census information about the occupational structure. The occupational groups organize themselves naturally into two broad categories — “white-collar workers” and “blue-collar workers,” the latter divided into agricultural and non-agricultural occupations. In the bottom section of the table we have summarized the information for changes in occupational patterns by using these broad categories. The pattern is a striking one.

First and most familiar is the decline of employment in agricultural occupations. Although this decline was almost over by 1971, it was a striking element of the preceding 30 years. In 1941 there were 1.1 million Canadians — 25 percent of the labour force — in agricultural occupations; in 1981 there were just over half a million.

It is less well known that the other extractive occupations that do not appear separately in our table, were also declining ones until the 1970s, and that the expansions of that decade were not large enough to restore the employment levels of 40 years earlier. In an arithmetical sense, therefore, the rest of the economy had to create enough new jobs in other occupations not only to absorb the growing labour force but also to absorb the workers who were displacing themselves from these primary or extractive occupations. From 1951 to 1981, the decline was almost 400,000 people.

The non-agricultural blue-collar occupations, especially in manufacturing and construction, were absorbing almost 550,000 persons per decade in the 1950s, 1960s and 1970s. These occupations expanded much more rapidly in the 1940s, and in the 1970s they were growing by more than in the 1950s and 1960s, though at a slower rate.

However, in the two decades 1951–71, the blue-collar occupations as a whole provided only 18 percent of the new jobs; the remaining 82 percent were white-collar. This pattern is striking enough. The shape of the 1970s continues it. In that decade, the labour force grew more than in the preceding two decades. Even so, only 20 percent of the new jobs were in blue-collar occupations, while 80 percent were in white-collar jobs. In an arithmetical sense, at least, for 30 years Canada has been sustaining a high and rising level of employment by absorbing people into white-collar occupations.

One group of white-collar occupations is directly linked with the production and distribution of commodities in the economy. This group contains the managerial, clerical and sales people. Their number increased by almost 1.3 million from 1951 to 1971, and by another 1.6 million in the 1970s. It now contains 34 percent of the work force. In principle, some sales workers may experience a sort of productivity gain simply because turnover goes up. But the number of such workers has

quadrupled since 1951, matching the increase in real GNP. As for the managerial and administrative category, their work has certainly been necessary if the growing economy was to function at all. But their number has quintupled since 1951, while real GNP has quadrupled. As for the clerical workers, whose work might be viewed in the same way, their number has increased slightly less than real GNP. Thus the number of clerical and sales workers has grown roughly in step with the real economy, while the number of administrative and managerial workers has grown considerably more rapidly. In 1981, the latter made up 7 percent of the labour force. If turnover had been increasing more rapidly than the number of managerial, administrative, clerical and sales personnel, it would be reasonable to argue that the average physical output per worker in these categories had been rising. But turnover has been rising at the same rate or less rapidly, especially and most emphatically in the 1970s.

The other group of white-collar occupations, the professional-technical and service-recreation occupations, stands in a rather different relation to the productive process. Insofar as it contains such professional categories as engineers, it supplies inputs to that process. But insofar as it contains teachers, professors, doctors, nurses, and lawyers, its members are at least in part the direct suppliers of services. The number of such workers may thus be said to be demand-led, in a very direct way. In these occupations it is very hard to find any convincing evidence that anything is raising labour productivity. But in the decade of the 1970s the number of teachers rose by 40 percent, while the number of medical and health professionals rose by 59 percent. Together, these two occupational groups are 8.4 percent of the labour force, while professional-technical and service-recreational workers make up 34 percent of the labour force.

By 1981, it appears that 69 percent of the Canadian labour force was in occupations where, for 30 years, there had been no strong evidence of technological change that could produce any pronounced productivity growth. In some directions, the rising turnover of goods required more administrative and sales workers, and these were supplied; in other directions, rising real income generated more direct demand for services, and these were also supplied; to some extent, as with managerial and administrative workers, occupational growth exceeded economic growth.

In the process, the taxing and spending of the state played an important mediating role. This is not to say that government itself actually expanded very much. In the course of the 1970s, the employment in the "public administration and defence" industry increased in absolute terms, but in relation to the labour force it hardly rose at all, and such increase as did occur was attributable entirely to the provincial and local governments: in relation to the labour force, federal government

employment declined. Public administration and defence required 5.8 percent of the labour force in 1951, 7.4 percent in 1971, and 7.5 percent in 1981; federal non-defence administration absorbed 2.0 percent of the labour force in 1951, and only 2.2 percent in both 1971 and 1981, while in relation to the growing labour force the defence burden was very sharply reduced. Much more important, however, was the recycling of funds to pay for education and health care, two activities which are not included in the above calculations. By 1977, 27.2 percent of consolidated government outlays went on health and education. Similarly, by spending 2.4 percent of their outlays on recreation and culture, governments helped to raise employment in “artistic, literary, recreational and related occupations” by 130 percent in the decade of the 1970s. The grouping was still small in 1981 — only 1.5 percent of the labour force. But without the special encouragement of policy, which was not in any direct way the reflection of consumer demand, it would certainly have been smaller still. In 1971, for example, it was 0.9 percent of the labour force, and in 1951, 0.17 percent.

Effect of Government Policy

Although government policies can do little or nothing to affect the pattern of technological change, and nothing at all to affect the income elasticities of demand, they certainly can affect the occupational and industrial distribution of the labour force, and it is increasingly common to suggest that they have done so. First and most obvious, governments often tax commodities but not services; by so doing, other things being equal, they accelerate the growth of the tertiary sector and retard the growth of the secondary sector; if foodstuffs are taxed, they produce the same effect on the primary sector, although it is difficult to believe that the effect is strong enough to be worth bothering about. Second, insofar as government provides some of the services of the tertiary sector, or subsidizes these, then the entitlement arrangements become very important indeed, and so does the administrative framework within which the services are offered. Education and health care are important examples. As population growth and rising per capita income shifts demand curves outwards, the resultant demand for labour will be much larger if government “meets the demand” at a zero price to the user, and much smaller if individual users have to pay the wages of those who provide the service; if government collects fees or uses administrative measures to “control the demand,” the result will be somewhere between these two extremes. Between 1951 and 1971, Canada moved a considerable distance away from the “fee for service” principle both in education and in health care, toward a “provision on demand” principle; in the 1970s there may have been some retreat from the latter principle, but the major institutional changes have been made — in Quebec, free

secondary schooling; throughout the country, free or almost free hospital and medical care, and proportionately heavier subsidies for university and other tertiary schooling, combined with new and comparatively generous aid for needy students. Thus it is not surprising that, after declining during the 1940s from 14.9 percent to 14.6 percent, during the 1950s and 1960s the proportion of the labour force in personal, community, and business services rose to 23.7 percent of the labour force, while in the 1970s it increased rather more slowly, rising only to 28.9 percent by 1981 — a figure almost double that of 1941 or 1951. If the social policies of the 1940s had continued until 1981, presumably the tertiary sector of 1981 would have been considerably smaller than it actually was.

Similar developments, and broadly similar forces, can be observed throughout the OECD. This fact should surprise no one who has attended to the traditional analysis of intersectoral shifts that we summarized above. Although the “service economy” is most highly developed in North America, it is almost as weighty in the economies of Europe and of Japan. With respect to the social services, which we have suggested account for much of the expansion in certain kinds of service employment, government policies have been broadly similar, while differing considerably in timing, detail, and vigour of enforcement.

Britain, for example, provided comprehensive health care long before Canada, but has controlled the physical provision of that care and the wage structure of the health professionals far more rigorously than the Canadian or the U.S. governments. The latter government, in turn, has yet to match Britain’s comprehensive provision, but the U.S. authorities do provide medical care for very large groups, and private medical insurance covers millions more; until recently, furthermore, both state and private arrangements made little attempt to control either the volume of service provided or the fee structure. Thus it is no accident that Britain allocates less GNP to medical care than the United States does, or that Canada, which combines comprehensiveness with greater attention to cost-control, falls between the United States and the United Kingdom. It is reasonable to suppose that if the United States and Canada had retained the fee-for-service arrangements that existed in 1945, both countries would have possessed fewer health professionals in 1981 than they actually did possess; for Britain, where the National Health Service has created an unsatisfied demand for “free” medical care while inhibiting the private sector, other suppositions might reasonably be entertained.

In education, all the OECD countries have demonstrated the same general movement. Higher proportions of the young adult and adolescent populations have been enrolled in secondary and tertiary education, while barriers to such education have been somewhat reduced insofar as government policy could affect them. The arrangements have been enormously varied — new networks of universities, community

colleges, state colleges, junior colleges, and various kinds of non-collegiate tertiary education; grants to private institutions; wherever possible, a shift of operating costs from fees to general tax revenues; scholarships, bursaries, and loans of various kinds; new sorts of secondary school; reduction or elimination of examinations or other non-financial barriers to "accessibility"; curricular changes of various kinds. Any and all such changes point in one direction, and they reinforce social and demographic pressures which, until the early 1970s, also pointed the same way.

With education, as with medical care, the various OECD countries have followed paths that are different in detail. In Britain, for example, higher education now costs the local resident only the income foregone, if any, but the number of "places" is rigidly controlled and the professoriate is not paid internationally competitive rates; the situation, in other words, is much the same as in British medicine. But even in Britain, retention rates in the late 1970s were far higher than they had been in the 1940s. In the United States there is no serious effort at "place-planning," except in certain elite colleges and professional schools, but tuition fees are widespread and student aid is far less available than in Britain. The Japanese have retained rigid and competitive examinations, but have proliferated secondary schools, colleges, and universities, almost all of which are state-aided and some of which are tuition-free or almost so. In Canada also, the financial and non-financial barriers to education are far less widespread and considerably less constricting than they were in 1945, when examinations were widespread, junior colleges and other non-collegiate tertiary institutions were almost unknown, and universities were few.

With respect to the arts, which as we noted above are now considerable employers of labour in Canada, governments in Europe and North America have followed parallel paths of expansion and subsidy, although the timing and the details have been different. In continental Europe, as is well known, the arts had been subsidized for many decades before 1945; in English-speaking countries, however, this had not been so, except with respect to galleries of painting and sculpture. So far as the English-speaking world was concerned, the turning point came in 1945, when, after three years of wartime experiments, the Arts Council of Great Britain was set up. As Keynes observed at the time, in a broadcast talk, "At last the public exchequer has recognized the support and encouragement of the civilizing arts of life as a part of their duty." In Canada the Massey Commission recommended a similar state initiative in the early 1950s, and after a five-year delay the federal government set up the Canada Council in 1957; provincial support, under various headings, followed in the 1960s; the U.S. federal government began central subsidy in the same decade.

Whatever the jurisdiction, these initiatives in health, education, and

official culture were made without regard to their longer-run implications for public finance, the allocation of resources, or the productivity performance of the economy. Nor could it be said that, in any very precise way, electorates “chose” the path of public provision. It is true that, in introducing the new arrangements, governments expected to win popularity, or at least avoid additional unpopularity. But in few elections were these massive new programs the central issues; indeed, most programs were introduced in mid-term, without any real attempt to consult the public. Sometimes, as with the creation of the Canada Council, governments pretended there would be no cost to the public: the authorities began by “endowing” the Council with the proceeds of a windfall that the succession duties had delivered. Generally, the public knew little or nothing about costs or manpower implications; indeed, as with the Canadian health insurance arrangements, it is arguable that governments were as ignorant as the public at large. Once introduced, the programs quickly presented governments with unexpectedly large bills, and the quest for efficiency in public services quickly became an important element in governmental planning. The quest might be pursued in various ways: by controlling access, as in Britain; by squeezing the professionals who provided the services, as in Canada; eventually, in the United States, by fee-control and other sorts of planning.

Changes in Occupational Distribution, 1971–81

Regrettably, Statistics Canada has yet to produce the industry-occupation cross-classification for the 1981 census. However, by applying the 1971 occupational structure within each industry to the 1981 distribution of labour among industries, we can calculate what the occupational structure would have been if there had been no intra-industry changes, and we can compare the results with the actual occupational totals for 1981.

This simple calculation yields quite interesting results. By 1981 there were substantially more managerial and professional workers than one would have expected on the basis of 1971 patterns, and a few more clerical workers, but rather fewer sales and service workers; summing over these five categories of occupation, we find that the 1981 actual figure exceeds our calculated figure (obtained by applying 1971 occupational patterns to 1981 industrial data) by 426.1 thousand, or 3.5 percent of the 1981 labour force. If we consider the three groups that are larger than predicted on the basis of 1971 intra-industrial employment patterns, we have an “excess” of 559.9 thousand managerial, professional, and clerical workers, of whom most are managerial and professional. It is to be supposed, furthermore, that the change in the occupational structure affected all industries but that the numerical effect must have been greatest in manufacturing, construction, transport, communication, and utilities, simply because in the service-producing sector the proportion

of blue-collar workers was already so low in 1971. In finance, insurance, and real estate, 95.3 percent of the workers were white-collar in 1971; in the service industries, 91.4 percent; in public administration and defence, 80.4 percent, and in wholesale and retail trade, 72.5 percent.

It is to be supposed, therefore, that the proportion of white-collar workers in the goods-producing industries has been going up, precisely when the rate of growth of labour productivity in these industries, and in the commercial service-producing industries, has been going down.

Of course it might be argued that without such a shift toward managerial, administrative and professional personnel, the productivity performance of these industries would have been still worse. There seems to be no way such a hypothesis could be tested. It should also be noted that in the course of the shift, there is a movement toward relatively high-paid occupations, a shift which, on marginal-productivity grounds, presumably reflects the comparative output-contributions of the various occupations within the industry. What is interesting, however, is the longer-run ability of investment and technological change to raise the productivities of the several sorts of labour.

Regrettably, information about productivity growth is almost always organized by industry, partly because occupational data could be generated only by very small-scale localized investigation. Anecdotal evidence tells both ways. The Bank of Montreal reports (1983, p. 36) that since 1976 the average number of transactions processed per employee in the Domestic Banking section has increased by 48 percent, while for the bank as a whole "the value of Bank assets administered per employee, adjusted to eliminate the effect of inflation, has increased by 65% since 1976." The bank also reports that in the same period "the proportion of management-graded professional, technical, and managerial staff has risen significantly, while the clerical component has declined." For other banks the results are much the same. Thanks to self-service, some branches of retail trade can turn over more merchandise with the same number of personnel, or with fewer. Thanks to high-speed drilling, division of labour, and a more rational organization of the office, the dentist of the 1980s can repair more teeth per year than the dentist of 1941. On the other hand, in many branches of wholesale and retail trade there is some evidence of "crowding," as boutique is added to boutique.

Because of changes in census arrangement, it is not easy to produce really long-period series on occupational structure. Nevertheless, for the province of Ontario, consistent series have been produced for the period 1871–1941. The results are sufficiently interesting to report here. They are based on the concept of "gainful worker," the concept that was used in several 20th century censuses. Over the period 1871–1941, the agricultural occupations fell from 49.6 percent of the gainful workers to 18.6 percent, while other primary sector blue-collar occupations rose

only from 1.8 to 3 percent. The total of primary sector blue-collar occupations thus fell from 51.4 to 21.6 percent. It might be supposed that the weight of other blue-collar occupations increased accordingly. But that was not the case. The importance of transportation workers did increase, from 1.8 to 6.5 percent. Even though the first figure is in a sense an underestimate because it does not include farm workers who worked part of the year in carting, there must have been some proportionate increase here. But the group consisting of manufacturing, construction, and non-agricultural labouring occupations hardly changed its relative importance, rising only from 32.6 percent of the gainful workers in 1871 to 33.5 percent in 1941, a year when the impact of war demand was certainly affecting the province's manufacturing industries. The remaining group of service occupations — clerical, trade, finance and other services — increased its weight dramatically, from 14.2 percent of the gainful workers in 1871 to 38.4 percent in 1941.¹⁷

Though it is not possible to produce really long-period distributions of the gainful workers by industry, the general pattern is clear: both in occupational and in industrial terms, Canadian economic growth, like that of other advanced industrial states, seems to have involved a shift from an agricultural economy to a "service economy."

It has long been argued¹⁸ that this structural transformation of the labour force reflects characteristics of supply, demand, and technological change that are not amenable to manipulation by government policy. The standard arguments are as follows:

In agriculture, employment falls because the price and income elasticities of demand for food are very low, reflecting the limited capacity of the human stomach, while there is plenty of potential for raising the productivity of labour; population growth and exportation can moderate the sector's tendency to contract its employment but are not likely to arrest it, especially if income levels in agriculture are initially below those in the secondary and tertiary sectors. In manufacturing and other secondary industries, we find many goods for which the price and income elasticities of demand are comparatively high, and plentiful potential for technological change, which will raise the average productivity of labour. There is also plenty of potential for inventing new goods and, for some goods, there may be an export market as well. We could imagine situations where the new methods are so effective that absolute employment actually falls, in spite of the high price and income elasticities of demand. It does not seem that this has ever been observed to occur, but it is common to find that the secondary sector, like the primary, becomes proportionately less important as a user of labour. Indeed, that has happened in Canada: the secondary sector employed 41 percent of the labour force in 1951, and only 33 percent in 1981. As for the tertiary sector, it has widely been suspected that here, labour productivity is hard, if not impossible, to raise, although it can be raised in

some components of the sector. Admittedly, this impression is hard to check, because in so many components of the sector we measure output on the basis of input. But perhaps the generalization may be admitted as a “stylized fact.” Meanwhile, the demand for the output of the sector is stimulated by any growth in GNP; also, some sorts of output, such as education and health care, are thought to have comparatively high income elasticities of demand. Thus if demand is strongly affected by growth in GNP and in GNP per capita, while labour productivity cannot rise at all, or very much, in a growing economy the absolute level of employment in the sector is certain to increase, and it is almost certain that the sector’s employment will rise in relation to the labour force as a whole. Hence the transformation that we see in Canada, where the tertiary sector employed 31 percent of the labour force in 1941, 36.5 percent in 1951, 50 percent in 1971, and 58 percent in 1981.

Adam Smith thought that workers were “productive” only if they produced goods; the national income accountants of the socialist states have adopted this convention, making an exception only for that part of the transport industry that moves commodities. They are careful to explain that unproductive workers are not unnecessary; indeed, they normally observe that they do some of the most important work in any society. Still, such workers do represent a burden on the “productive workers,” in the sense that all workers, whether productive or unproductive, wear and consume the commodities that the productive workers generate, either directly or through foreign trade. Similarly, it is productive workers who do the work that embodies itself in new capital goods, and in additions to inventories. Here one is thinking of an industrial distribution of the labour force, not an occupational one: white-collar workers are defined as productive if they work in the goods-producing industries, in freight transportation, and in utilities.

This point of view, which is comparatively unfamiliar to “mainstream” economists in Western countries, does cast a certain light on the long-period dynamics of economies like Canada’s. We have been able to support a superstructure of “unproductive” workers in service-producing industries — a superstructure that has grown proportionately through most of this century — because of rising productivity per worker in the goods-producing industries. This rising productivity has also produced a rising standard of living. Indeed, that rising productivity has usually been more than enough to “do the trick,” in that we have frequently been in surplus on commodity trade even when our current account has been in deficit. However, the “burden” of the unproductive workers has been rising through time, in proportionate terms: in 1946, 31.6 percent of the nation’s labour force was in trade, finance, insurance, real estate, and other services not including transportation, communication, and utilities; in 1981, the percentage was 59.2. In 1946, every “productive” worker supported, in physical terms, just under half of an

“unproductive” one; in 1981, he or she supported more than one “unproductive” worker.

To a considerable extent, the rising of living standards has been a cause of the increasing number of “unproductive” workers in the service industries. All these industries employ some blue-collar workers, and for these workers, technological change has presumably been effective in raising labour productivity. But such workers are few, in relation to white-collar workers, in the service industries. For some white-collar workers, in fields like banking, embodied technical change has raised labour productivity; without such change, the number of white-collar workers would presumably have risen even more. It is widely believed, or hoped, that with the spread of electronic and computer technology, labour productivity can be substantially raised in such fields as trade, finance, and insurance, and perhaps also in public administration. Unless this belief materializes, it is reasonable to suppose that the expansion of employment in the service industries, because it consists so largely of white-collar workers whose productivity is hard to raise, has dampened and will dampen the upward movement of living standards in the economy as a whole.

Finally, we come to the question of inexperienced young workers and of female workers. It is quite clear that throughout the postwar period, female workers were becoming proportionately more important in the labour force, and that this tendency was especially striking in the 1970s, precisely when there was also a very large influx of young and inexperienced workers, the result of the baby boom that had ended in the late 1950s. The results, in terms of average real earnings and measured average productivity, were inevitable and obvious, especially insofar as the new workers were absorbed to such a large extent in the comparatively low-wage occupations and in the service industries. Fortunately, it is to be expected that as the young workers become more experienced and as the influx of new female workers diminishes, there will be some improvement in measured productivity growth — something which, in Denison’s scheme, would turn up in the “residual” some time later in the 1980s.

The International Context

Because the disappointments and disruptions of the 1970s have affected the entire industrialized world, it is natural to consider whether some common elements may have been at work. Here we are not concerned with the inflationary experiences of the decade, but with the other elements of disappointment that have been so commonly observed. We begin by examining the large dynamic schemata of Lewis, Kindleberger, and Kaldor. Then we turn to the closely related work of Andrea Boltho and his co-workers at the OECD. Finally, we consider a family of

explanations that have been usefully surveyed, and augmented, by Michael Beenstock. Throughout our examination, we shall ask what these great all-embracing schemata have to tell us about developments in Canada.

Permissive Labour Supply Seen as Basis of Growth

In the early 1950s, W. Arthur Lewis published a classic paper entitled “Economic Development with Unlimited Supplies of Labour” (1954). A cross between neo-classical and Marxist modelling, the Lewis schema postulated an economy that could experience a sort of supergrowth because it could pump labour out of the primary sector in step with the accumulation of capital in the rest of the economy; because labour was available on favourable terms, there was little or no upward pressure on the wage rate, and profits would grow along with capital accumulation, being successively ploughed back so as to give the machine another crank.

In 1967, C.P. Kindleberger elaborated the schema, applying it to the postwar growth of Western Europe; he argued that in most of the countries that had experienced supergrowth, labour supply conditions had been especially favourable, sometimes because the primary sector was so large in 1950 and sometimes because of immigration.

Nicholas Kaldor (1966),¹⁹ meanwhile, had produced an essentially similar three sector model, the original purpose of which was to explain and justify two things: Britain’s comparatively dreary growth performance, and the selective employment tax that Kaldor, in his capacity as policy advisor, was urging the British government to apply within the service industries. The Lewis-Kindleberger apparatus was certainly hostile to the spirit of neo-classical microeconomics in that it explicitly assumed that factor returns were not equalized in the several sectors. Kaldor went further: drawing on the hypotheses of the Dutch economist Verdoorn, Kaldor argued that in the secondary sector there were “dynamic and irreversible economies of scale,” such that the growth rates of GNP and labour productivity varied directly and systematically with the growth rate of manufacturing.

As with Kindleberger-Lewis, for Kaldor labour supply was permissive, in that if labour were in ample supply, it would be easy for output to grow. The main role of the primary sector was to give up labour; in so doing, it would find that its own labour productivity would rise. “Supergrowth” might be started by anything that raised manufacturing output — for instance, by a deliberate or accidental undervaluation of the currency. It would continue so long as labour was available, and would end when extra labour was not to be found on satisfactory terms. In this whole process, therefore, the tertiary sector was a threat: it could and did absorb labour, but it offered no dynamic economies of

scale, and as there was little sign of productivity-raising innovations in the tertiary sector, it was likely to offer, at best, a sort of dynamic constant return to scale. For a country such as Britain, where the agricultural sector had been tiny since before the First World War, and where the tertiary sector had been growing rapidly, at least in employment terms, since the late 19th century, slow growth thus appeared inevitable; Britain's depressing performance could be blamed on "premature maturity," not on the unions, management, the universities, or the government.

Both for Kindleberger-Lewis and for Kaldor, the role of the agricultural occupations is to give up labour to other occupations and other sectors, thus presenting, delaying, or reducing the upward movement of real earnings in these non-agricultural sectors. For Kindleberger-Lewis²⁰ the result is a sort of profit inflation in manufacturing: as this sector grows, the absolute amount of profit increases more rapidly than it would if wage rates were rising more rapidly, and there is some suggestion that the profit share also increases; the resulting flow of funds, in Marxist fashion, is invested in further expansion of manufacturing, where labour absorption increases both because of demography and because still more labour is transferred from agriculture to manufacturing. The growth in manufacturing appears to be an extensive one; there is no suggestion that capital is being substituted for labour, or that any particular sort of technological progress is at work. For Kaldor,²¹ however, a more dynamic process is envisioned. As the manufacturing sector grows, it is imagined to experience dynamic and irreversible economies of large-scale production, so that when output grows quickly, so too does productivity. In both schemata, labour supply is a permissive element only. If labour is "not available," or if its price rises "too rapidly" or "too steeply" in face of an increased demand, investment will not continue to rise (Kindleberger-Lewis), or labour productivity will not rise so rapidly in manufacturing (Kaldor), because the "labour shortage" is preventing output from rising.

Lewis himself, and also Kaldor, worked with models where immigration and emigration are ignored; Kindleberger (1967), analyzing postwar Europe, recognized that immigration — from East Germany, Spain, Portugal, southern Italy, and the Balkans — helped keep labour supply comparatively easy in postwar Western Europe. Others have noted the potential significance of West Indian, Irish, and East Indian immigration to Great Britain, or of emigration from Britain to North America and the Antipodes. For Canada, it is of course impossible to ignore immigration. From 1946 through 1971, the total number of intending workers among the immigrants was 1,833,907 (Canada, Canadian Immigration and Population Study, 1974, Table 5.1). This is almost three times the out-migration of farm owners and farm labourers over the period 1941–71. Insofar as Kindleberger-Lewis-Kaldor forces may have been imagined

to have been at work in Canada, therefore, immigration was far more potent a “controller” than agricultural out-migration.

Population growth, and rising participation rates, also played an important role. From 1941 to 1971 the population aged 20 through 64 rose by 7 million and from 1951 to 1971, by 5.2 million (Leacy, 1983, Series D1). Those gainfully employed, or in the labour force, increased in number by 4.2 million, 1941 through 1971, and by 3.3 million, 1951 through 1971 (*ibid.*, Series D2), while the overall participation rate rose from 53 to 57 percent (*ibid.*, Series D3). Female participation rates rose with fair regularity in all age groups, 20 through 64, substantially more than enough to offset the declines for both sexes in the 14 to 19 age group, and for males aged 20 to 24.

Where immigration is so substantial, and where the labour force is growing so rapidly, it does not seem very wise to stress the out-migration from agriculture in explaining any “profit inflation,” or any other important element in the supply pattern for labour to the other sectors of the economy. For other economies, of course, the numerical pattern may be different — perhaps different enough to give Kindleberger-Lewis, or Kaldor, some explanatory power. However, it has been persuasively argued that this is rarely or never so. If, with Kaldor, we want to believe in dynamic irreversible economies of scale, we had better concentrate on older-fashioned elements — especially on the side of the demand for manufactured goods.

Although there is still considerable controversy about the Kindleberger-Lewis and Kaldor schemata, and although Kaldor himself has modified his own position almost out of recognition in recent years, the basic ideas that we have sketched above have become part of the common intellectual equipment of economists, especially perhaps in Western Europe, where indeed, they are important elements in the work of Andrea Boltho and his co-workers.

Boltho et al. on Labour and Growth

Boltho (1982) and his 24 co-authors are concerned to report and explain almost everything that has happened in the economies of Western Europe since 1945. They provide seven country chapters, five policy chapters, nine chapters dealing with “cross-country trends,” and a short introduction. It is difficult to detect any common explanation or common approach, although there is little detectable interest in Marxist, monetarist, or neo-classical modelling; there is a monetarist inflation chapter and also a Marxist “growth and crisis” chapter, but one has the impression that these are included only to balance the chapters on growth and inflation that are written from very different viewpoints. The contributors reveal a strongly “organizationalist” bent: some 12 of the 25 have worked for the OECD, and another 8 have worked for other interna-

tional organizations or for national governments. While it would be possible to mine the “country” chapters for insights that might be applied to the Canadian scene, the result would inevitably be a very extended essay; therefore, we shall concentrate on three of the “cross-country” chapters — the two growth essays, and the essay on the labour market and unemployment.

Examining European labour markets in the Boltho compendium, Franco Bernabè traces a pattern that is very different from the Canadian, even in the 1970s, as Table 1-3 reveals. It will be noticed that in Canada total employment grew year by year, and by rates that exceeded those of any other North Atlantic state; it will also be seen that there were considerable advances in all three of the non-agricultural sectors as identified by the U.N. Economic Commission for Europe. Furthermore, although employment in “general government” grew with especial speed in Canada, this kind of work provided few of the extra jobs — not quite five percent of the total additional employment from 1970 through 1981.

In Britain and continental Western Europe, the 1970s were years of employment stagnation, with the only significant job expansion coming from the public sector. The time-shape of development, too, was different. Canada began the 1950s with substantial full employment, and the considerable job creation of the next three decades was accompanied by a trend increase in the unemployment rate. The continental economies moved to very full employment only in the 1960s, and then, thanks in part to that situation and in part to the political-social conditions that followed, the decade of the 1960s ended with a wage explosion, and with the rapid spread of quite forceful measures of job security, which had no counterpart in Canada or the United States. These measures, adopted in France, Germany, Italy, Britain, and the smaller countries, did not prevent manufacturing employment from drifting downward, especially in Austria, Belgium, Denmark, France, West Germany, the Netherlands, Norway, Sweden, and the United Kingdom. Nevertheless, they did make layoffs difficult, or very expensive, and in some firms and industries, perhaps impossible.

According to Bernabè, firms responded by evincing a reluctance to hire, and the result was a “segmentation” of the labour market, in which young people, in particular, had great difficulty in finding jobs. But given that employment was declining in so many sectors, it is perhaps possible to exaggerate the effect of segmentation, as opposed to the failure of aggregate demand, in explaining the troubles of the decade. Meanwhile, many firms must have found themselves overmanned, and married women were coming into the labour market in unprecedented numbers. Unemployment insurance systems became more liberal, but this occurred only in the later 1970s, and it cannot have much affected youth unemployment, because so few of the youth would have qualified for

benefits. The unemployment insurance systems, however, may have attracted some “secondary” workers, who seek and perhaps find jobs merely to qualify for unemployment benefits. The result, Bernabè thinks, was a gradual decline in labour-market flexibility, so that by the early 1980s the European labour markets were apparently less flexible than either the American or the Japanese. Bernabè’s reflections parallel those of Ostry, which we report in our final section, and may even be the source of those Ostrovian meditations. In conclusion, Bernabè sees little prospect for rapid employment growth, and considers that unemployment may rise further during the 1980s. He has no sense of any general-equilibrium adjustments that might spontaneously return the system to full, or fuller, employment.

In the same compendium Jacques Mazier, a professor at Rennes who, in 1982, was working for the French Planning Commission, offers what he calls a Marxist interpretation of the deep crisis that he believes the capitalist world entered in 1974. To a non-Marxist the discussion is somewhat perplexing, partly because Mazier believes himself to be innovating within the general approach that Marxists might favour. Thus, for instance, he differs from Baran, Sweezy, and Mandel. His analysis, however, is really not terribly novel, except perhaps in terminology. He believes that the 1950s and 1960s saw a gathering “crisis of overaccumulation,” as evinced by falling rates of profit; there was also a “reproduction crisis at the international level,” reflecting the whole conjuncture of international political economy. As a result, after 1974, investment incentives were weak in Western Europe, partly because real incomes were growing slowly, a development attributable partly to OPEC and partly to restrictive economic policies.

Boltho’s own analysis is not fundamentally different from Mazier’s so far as investment is concerned. Like Mazier, Boltho sees the 1950s and 1960s as decades of investment-propelled growth. But unlike his Marxist colleague, Boltho is impressed by the importance of cheap raw materials and plentiful labour. As for the sharp deceleration that occurs in the early 1970s, Boltho argues that we cannot understand these developments without attending to business confidence and to labour supply. The boom of the 1950s and 1960s was fragile, he thinks, because it depended on elastic labour supplies and on business confidence. The argument for elastic labour supplies is elaborated along Lewis-Kindleberger-Kaldor-Verdoorn lines. But Boltho recognizes that these supply conditions are permissive only; what mattered in the 1950s and 1960s, he thinks, is the demand side — much higher investment propensities than before 1939, reflecting a variety of investment-generating circumstances, all of which affect expectations, the link being confidence. Following Angus Maddison (another former OECD economist), Boltho emphasizes the importance of the new international economic order, and the new array of domestic policy instruments that businessmen believed

could control cyclical fluctuations. He mentions the Marshall Plan, Bretton Woods, plentiful reserves coming from the American balance-of-payments deficit, Keynesian policies in some countries, and the impact of reconstruction in other lands. He says nothing of technological progress, whether focussed on new products or yielding new methods, as a possible generator of investment incentives; given the availability of labour, confidence is all.

To those of us who have had to lecture on Europe's postwar boom, Boltho's ideas will be very familiar. Lurking in the background, furthermore, is an attractive though incomplete theory of capitalist investment — one which, in that it is entirely tautological, can be applied to any time or place and which must always be "correct." If "confidence" is assumed to be everything, then anything can be explained by reference to "confidence," which, fortunately for the theory, cannot be directly observed.

Boltho argues that two things went wrong after 1971, or after 1973. One thing was the "diminished supply elasticity of agricultural workers" helping to produce a diminishing share of profit in GNP — "a shift in income distribution away from capital," a movement also assisted by legislative changes in most of the European OECD countries. Rising wage claims, therefore, were passed on in the form of higher prices, while the declining profit share damaged business confidence, both depressing investment directly and forcing more recourse to external finance, precisely when governments were running larger deficits. The other mishap was the demonstration that governments could no longer prevent recession, indeed, that some governments provoked or worsened recession. This demonstration further weakened confidence, marking a major change from the 1950s and 1960s, in which business confidence in the government's power to stabilize was an important element in encouraging investment. Boltho (1982, pp. 27–28) continues:

. . . it can be argued that a slowdown was inevitable, but not so much because of the progressive drying-up of earlier sources of growth (American technology or farm labour), but rather because of the successful working of the capitalist system itself. The achievement and maintenance of full employment conditions for a number of years was probably incompatible with a reasonable degree of price stability, or, at least, a steady rate of inflation. . . . In a way, the successes of the 1950s and 1960s had laid the preconditions for at least some of the failures of the 1970s.

The "failure" with which Boltho is concerned has several dimensions — accelerating inflation, rising unemployment rates, and a decline in the rate of growth of productivity. However applicable his analysis may be in the Western European context — and about this there can be many reservations, especially given the fact that investment ratios were quite well sustained after 1973 — it does not tell us much about the Canadian situation.

The Canadian Situation

First, let us consider the question of investor confidence. In that Canadian GNP never declined during the 1970s, the Canadian case is quite different from the European, where several countries did suffer moderate recession in mid-decade. Conversely, the experience of the late 1950s was widely interpreted in Canada as “recession,” even though, as we saw above, output did not decline. Thus the record, both before and after 1973, would probably not have suggested to businessmen that the government could not keep the economy growing. However, there were plenty of other reasons during the 1970s for business nervousness about government policy, both federal and provincial (Bothwell, Drummond, and English, 1981, chap. 33). If we are to import Boltho’s idea to the Canadian scene, therefore, we might want to emphasize not Keynesian stabilization but other aspects of economic policy. However, it should be remembered that investment seldom declined during the 1970s, and that by 1980–81 it was considerably larger in real terms than it had been at the start of the decade. A failure of confidence might be expected to produce rather more dramatic effects on investment.

Second, let us consider the whole question of labour supply. Even on the European scene, there are some problems with the Bolthovian analysis, ignoring as it does the Bernabè findings with respect to young workers and female workers. One asks oneself why, when the labour force is growing quite rapidly for such reasons as these, and when immigrants are still available, at least in potentio, the absorption of agricultural workers should appear so important. Perhaps the only reason is that Kaldor and Kindleberger thought it important. Similarly, on the Canadian scene, it is necessary to consider the whole question of labour force growth and reallocation since the Second World War. In Canada, as in Western Europe, the agricultural labour force shrank dramatically, and in Canada it stopped shrinking during the 1970s. But in Canada, as we saw in the last section, the change made very little difference; indeed, for Canada one cannot make very much out of the primary sector, even before 1971, and analyses such as those of Boltho, Lewis, Kindleberger, and Kaldor, which place great emphasis on the point, seem to have little or no applicability.

Other Theories of Growth

Of course, there are many other general arguments that are meant to explain the deceleration of the 1970s. Following Beenstock (1984) we will first report on one of Cornwall’s (1977) hypotheses and then say something about Kondratieff cycles and “long waves”; to end the section, we shall look at Bruno, Sachs, and Beenstock’s own “transition theory.”

In the Cornwall hypothesis of 1977 that Beenstock describes as “appealing,” the diffusion of technological knowledge is accompanied

by a slowdown in OECD economic growth, because more and more OECD countries will approximate more and more closely to the technological frontier, as exemplified in U.S. practice. The gap creates large but temporary opportunities to raise factor productivity, and generates important but transitory investment incentives. In turn, the gap exists in the first place for accidental reasons — basically, because of the First and Second World Wars, which produced stagnation and retrogression in Europe while U.S. progress continued.

The fundamental insight is of course not original with Cornwall, who has, however, given it precise econometric formulation. Beenstock accepts that formulation, but goes on to note that the Cornwall argument cannot explain the sudden deceleration of the 1970s, because the “average technological gap” did not suddenly narrow. At best, therefore, the Cornwall hypothesis suggests a long-term OECD deceleration, not a sudden change. Nor does it seem to have much to say about Canada, which in the Cornwall scheme is surely more like the United States than like Western Europe. Furthermore, Canada’s trading links with the United States have become steadily stronger since the end of the Second World War, while the links with Europe — especially with Britain — have become weaker; the indirect effects of European growth, therefore, must have become less important in comparison with the indirect effects of American growth. On the other hand, insofar as technological diffusion tells us anything about the remarkable performance of the Japanese economy, which emerged as a significant Canadian market and as a significant competitor only in the 1960s, the Cornwall thesis does help to explain the development of Canada’s trade and, in certain industries, of her domestic production as well.

The “long-wave hypothesis” is an old idea that became fashionable in certain quarters late in the 1970s and that certainly does not deserve the name of a “theory.” The idea of a 50-year “long wave” was first proposed by the Russian economist Kondratieff; an English version of his seminal paper first appeared in 1935, and the idea of such long waves was adopted by the Austro-American economist Schumpeter, who linked it with his vision of innovatory “waves.” Kondratieff’s original treatment ended in 1920, and used nothing but price data, no real GNP series being available at that time. The revival of interest in Kondratieff’s work has followed from the observation that there is an eerie parallelism between the 50-year wave in prices before 1920 and the actual pattern of output and employment since 1920. Stylizing in Kondratieff fashion, one would speak of 25 bad years, 1920–1945, followed by 25 good years, 1945–1970, and then the beginning of a new and depressing Kondratieff wave at that last date. The period 1970–95, then, is predicted to be a period of slow growth and comparatively high unemployment — a “Kondratieff slump” on which, of course, one superimposes the ordinary movements of the shorter-term business cycle. For any one country, such as

Canada, the effects of the Kondratieff slump might be mitigated by particular local developments, but no member of the international trading system could expect to escape most of the effects.

Such schemata are likely to appeal to “chartists” and to others who believe that by plotting numbers on graph paper, after perhaps removing the trend factor, one can detect hidden laws of historical notion. For the same reason we might expect them to appeal to Marxists. But insofar as there has been any revival of scholarly interest in Kondratieff-type waves, we may notice the characteristic origins in what might be called old-style economic history.

First, and most important in terms of public visibility, we may notice the recent works of the American economic historian W. W. Rostow, whose interest in long wave-like motions goes back to the 1940s. But there are, as always, very serious problems about Rostow’s handling of the data, whether or not one is impressed by his explanatory framework. That is to say, his periods of “trend boom” and “trend slump” do not correspond to the periodization that most economic historians would use, and there are serious problems about the relative-price data that are central to his analysis.

Second, and much less disputed within the profession, is the tendency to tell the story of modern international economic history in terms of bunched major innovations — in terms, admittedly, of “Schumpeterian innovations,” where these are defined along Schumpeterian lines to include new goods, new methods, new markets, new sources of supply, and new organization of industry, marketing, or whatever. There is nothing “in nature” that requires or ensures that such innovations need be bunched. Nor would anyone now deny that in certain important respects the process of innovation is continuous, or that it is in part a response to economic incentives. But the historical record does show bunches of innovation, and it does appear that such bunching has produced investment-bunching on Schumpeterian lines, quite sufficient to produce extended periods of comparative prosperity and comparatively rapid growth. The impact will naturally spread throughout the world trading system, but in any one region it may be especially strong or especially weak, depending on local circumstances. Viewed in this way, however, Kondratieff-type waves are simply a way of organizing our understanding of the past; they certainly do not support any prediction, as for instance for the period 1970–1995.

There is an increasing tendency among economists to “reason such things away” and for those who know the historical record, that tendency is perplexing. It is sometimes suggested, for instance, that if people know there will be shortages of certain sorts of capital goods, they will accumulate them in advance, thus smoothing the investment cycle out of existence. This line of argument begs several questions; the most obvious is the fact that the investment cycle has been a feature of

capitalist economic life for two centuries or more, and only slightly less obvious is the impossibility of advance accumulation when the relevant technologies have yet to be invented. There are also problems about the transportability, divisibility, and permutability of various capital goods. Nor is it obvious why private rationality should necessarily reconcile itself with rationality for the capitalist class as a whole. Property developers are often thought to be among the most rationally foresighted of all capitalists. But consider what happened to the stock of luxury condominiums in Toronto, or to the housing stock in Edmonton or Calgary during the past few years, where overbuilding has occurred and developers have been left with newly built inventories that they have found very hard to sell.

Beenstock himself has a special professional interest in the sorts of general-equilibrium models that are commonly employed in the pure theory of international trade; it is not surprising, therefore, to find him deploying such models when analyzing the 1970s, even though the models are intractable and even though they rest on very particular assumptions. As employed by Beenstock, for example, these models assume that the world supply of the inputs cannot increase, that capital can move from country to country but labour apparently cannot, and that technology does not change. Obviously, the real world does not accord with these assumptions; whether that is a debilitating fact, or whether the models can nonetheless perform like parables or myths, conveying a kind of truth, is to some extent a matter of taste.

Beenstock begins by directing our attention to several papers in which Bruno and Sachs examine the general equilibrium impact of raw material prices on the supply side of the economy, where both the price of raw materials and the cost of capital are exogenously determined — the latter by time preference, the former by external forces. The conclusion is that if raw material prices rise, there will be a decline in the consumption of raw materials, a decline in the capital-labour ratio producing a fall in investment, and declines both in output and in real wages; if real wages do not fall enough, or do not fall at all, there will in addition be unemployment, and output will fall farther than it would otherwise fall. If the *ceteris paribus* assumptions are violated — for instance, by Cornwall-type catching-up and/or by continuing technological progress, whether embodied or disembodied — or if there are errors in measurement—for instance, and most importantly, of the capital stock — the actual observations may well deviate from the pattern that the model would predict. Nevertheless, one would expect that a change in the rate of increase of the prices of raw materials would produce a change in the rate of increase of labour productivity and of the “own product real wage.” And that is what Bruno reports for the 1970s as compared with the period 1955–72.

Taking comfort from this observation, Beenstock proceeds to extend the Bruno-Sachs approach to treat “de-industrialization,” by which he

means a decline in the share of industrial output in total output (1984, p. 35), exactly the sort of thing that happened in the industrialized world in the 1970s compared with the 1960s. He continues the Bruno-Sachs assumption that the industrialized world produces no raw materials, but he now divides the domestic economy into two sectors, one of which produces industrial and the other non-industrial goods (or, presumably, services). Adding the additional assumptions that the industrial sector is comparatively capital-intensive and that it is relatively dependent on raw materials, Beenstock concludes that a rise in the price of raw materials will indeed produce de-industrialization, even when the country produces no raw materials; if it does so, the de-industrializing effect will of course be still more marked. Labour, meanwhile, tends to move from the industrial sector to other sectors.

It may well be, therefore, that the Bruno-Sachs-Beenstock general equilibrium approach helps us to understand the remarkable growth of tertiary sector employment that we can observe not only in Canada but in other countries during the 1970s. However, since Canada is not only a producer of manufactures and non-industrial output but a considerable producer and exporter of raw materials, and furthermore an importer of these, the Bruno-Sachs model cannot be applied to Canada in any direct way. Indeed, the commodity terms of trade moved in Canada's favour during the 1970s. On the other hand, the model implies very considerable short-run disturbances in the industrialized world as a whole, even if, in accordance with general equilibrium tradition, these disturbances are treated as "transitional." Furthermore, the model does serve to remind us that many of our major trading partners did actually become poorer during the 1970s, while others faced a considerable reduction in the rate at which per capita real income was rising. It is reasonable to suppose, therefore, that in certain respects Canada's export trade would have done better if "Bruno-Sachs disturbances" had not been so pronounced a feature of the 1970s.

Few scholars set out to "survey the literature" without proposing to increase that literature, and Beenstock is no exception. To explain the troubles of the industrialized world he has his own theory, which he calls "transition theory." This is a three sector general equilibrium model of the world economy, and it is constructed on the assumption that there is no change in technology, and no increase in factor supplies. The world is divided, for purposes of the analysis, into the Developed Countries (DCs) and the Less Developed Countries (LDCs); the model is driven by an exogenous force — the spread of industrialization to the LDCs. This new industrial revolution changes relative supplies and relative prices, depressing the prices of manufactures in comparison with the prices of primary products. The result is a necessary restructuring of the DC economies, as resources leave certain basic or light manufacturing industries. "The recession in the West," Beenstock (1984, p. 60) writes,

has been brought about by this restructuring; the economic upheavals that have taken place since about 1970 have been a consequence of a major realignment in the balance of world economic power. In theory, the restructuring could have gone smoothly. . . . In practice, however, resources have not been able to deploy themselves so easily and industries have been dying faster than new ones have been born. In time the full transition will be achieved.

Beenstock begins, along lines that are familiar to Kaldoreans, by emphasizing that the economic growth of the 1950s and 1960s was particularly pronounced in the manufacturing sector. Industrialization of LDC, however, caused the relative supply of manufactures to increase by the end of the 1960s, so that the relative price of commodities rose and the relative price of manufactures fell, triggering “de-industrialization” across the OECD, producing a flow of LDC manufactures to OECD countries, and raising the return on capital in the LDCs relative to returns in the DCs. The results are several-fold: the profit share declines and the wage share increases, the tertiary sector is likely to grow in relation to the manufacturing sector, and capital flows from the DCs to the LDCs, inducing a decline in the DC capital stock, and changing the composition of DC-to-LDC trade flows, as more of LDC imports consist of capital goods while more of DC imports consist of simple manufactures. Meanwhile, in the DCs, because factors are not perfectly mobile or malleable and because wage rates may be sticky, labour supplies do not match labour demands, so that “mismatch unemployment” appears, while the decline in DC capital stock implies, on marginal productivity grounds, that real wages must fall in the DCs (Beenstock, 1984, p. 84), even though the total output of goods and services in the world economy has gone up in the face of a constant population, constant labour force, and constant world capital stock.

At this point the analysis becomes puzzling. It is hard to see how the wage share can rise while real wages are falling, unless the decline in the capital stock is quite dramatic. Since in Canada the wage share did not rise in the 1970s, the analysis presumably does not apply to Canada in any event, however neat its applicability to lands where investment stagnated or actually fell. Nor is it obvious that “capital” can be unambiguously measured in Beenstock’s model, since prices, costs and profit rates have all changed with the advent of the LDC competition. It might be thought that Beenstock’s result applies in some long-run equilibrium sense. But the capital stock cannot have been in equilibrium at the beginning of the “Beenstock transition,” in the mid-1960s, because net investment was positive everywhere. The change in profit rates might cause DC capital stock to grow more slowly, so that in the DC countries eventual equilibrium capital stock, say in 1995, is smaller than it would otherwise have been, and real wage rates do not rise so quickly or so far

as they would otherwise have risen. Further, one asks oneself how a flow of capital *funds* from the DCs to the LDCs can reduce the stock of capital *goods* in the DCs. If the model is really a general equilibrium full-employment one, as Beenstock intends, then presumably there is some machine rental rate at which all the DC capital goods are kept in use, so that although the value of the DC capital stock may decline, in physical terms the cooperating labour is as productive as before and it is hard to see why the “own product real wage rate” should change. Meanwhile, of course, the purchasing power of the “own product real wage rate” will have been affected by the change in the commodity terms of trade. In terms of primary products, that purchasing power certainly declines once and for all with the change in relative prices; in terms of manufactures, it does not. Similarly, the purchasing power of a given money wage rate will move in accordance with the relative price movement and with the composition of the consumer price index. Beenstock does not discuss such matters. The course of DC real wage rates, therefore, is difficult or perhaps impossible to deduce from the Beenstock model.

On the other hand, Beenstock’s observation with respect to LDC industrialization is a genuinely novel insight, and his documentation with respect to its scope and its impact on world trade is extensive and convincing, so far as the direction of effect is concerned. Surely it would be widely agreed that in many LDCs industrialization has “taken off” since the mid-1960s with disruptive effects on some DC industries. Beenstock (1984, p. 111) shows that by 1980 the developing countries provided over 9 percent of world trade in manufactures, as against 4 percent in 1960, while their share of world value-added in manufacturing had risen from 9 percent in the early 1960s to 14 percent in 1980. The difficulty is to convince oneself that changes of such magnitude are large enough to produce the dislocations that are actually observed in the 1970s and early 1980s. Nor is it easy for the economic historian to live within a model that allows neither for capital accumulation nor for technological progress in the world economy as a whole.

With respect to the future of the OECD as a whole, Beenstock is less than encouraging. He tells us that the current troubles are transitional, and that the DCs will eventually return to full employment. But this is a mere assertion, offered on the usual neo-classical, general equilibrium grounds. Less encouragingly, he reminds us that as yet the industrial revolution has made only small inroads into the LDC world, so that further “transitions” are to be expected — with, presumably, the same attendant dislocations for the DCs. These will, for Beenstock, be minimized insofar as the factors of production, especially labour but also capital, are flexibly priced and readily relocated. Nevertheless, one should expect the DC terms of trade to deteriorate — apparently forever, or at least until LDC industrialization is in some sense complete.

Relevance to Canada

For Canada, an exporter of so many raw materials, the Beenstock story is rather more encouraging than for other OECD countries. If we believe Beenstock, we conclude that the commodity terms of trade will continue to move in Canada's favour, and that our gains from trade can be further increased if we will abandon our "new protectionist" measures in such fields as textiles and footwear. This really adds up to little more than an update of the Paley Report of the early 1950s, crossed with an element of traditional free-trade doctrine. But the implied future — de-industrialization, a renewed emphasis on the primary sector, and presumably a continued burgeoning of the tertiary sector — is one that many influential Canadians do not much like, even though it might be the income maximizing strategy for our country. Nor should we forget that in Beenstock's model there is no technological change — the force that has so often seemed to save raw materials and to worsen the prospects in the extractive industries. Thus, in Beenstock's world nobody ever discovers optical fibre, thereby damaging the markets for copper and aluminum. Nor are better fuels or insulators ever devised. To economic historians, preoccupied as they so often are with technological change, such omissions are very nearly disabling.

Even more thought-provoking are the attempts at historical interpretation with which Beenstock illustrates his main argument. It has long been recognized by economic historians that in the late 19th century "something happened." On the one hand, industrialization spread rapidly from Britain to continental Europe and North America; on the other hand, thanks to overseas settlement and reductions in transport costs, Britain and Western Europe were deluged in food imports. For Britain the result was a decrease in the growth of manufacturing, combined with a quite dramatic improvement in living standards, and a rapid growth of the tertiary sector, as well as a very large export of capital funds. Britain was de-industrializing, meanwhile reorganizing her own economy to seize the new opportunities that had appeared. Beenstock explores this historical adventure, applying his own model insofar as he can. The example prompts one to reflect on the 1930s, when the commodity terms of trade moved sharply in favour of those countries, such as Britain, which imported foodstuffs and raw materials. Largely for this reason, among those who did have jobs there was a quite dramatic rise in living standards, and the "new industries" that catered to this new domestic prosperity did very well indeed, while the "old industries" that depended on export markets remained very depressed throughout the decade. In the countries such as Canada that depended on the export of primary products, the 1930s were very unpleasant indeed.

Canadian trade is now very different from what it was in the 1930s, presenting new opportunities to seize new gains from trade and spe-

cialization. Without intending to do so, Beenstock draws our attention to some of these gains. Insofar as some manufactures could be imported on much more attractive terms during the 1970s and 1980s than in earlier decades, because of industrial development in Japan and the Third World, it is anything but wise to reject the gains this sort of trade presents — especially at a time when our own rate of productivity growth has fallen so markedly.

At a more complex level than the ones we have been tracing above, Beenstock is deeply depressing; he observes that in the late 1960s there was general optimism about the economic future, in spite of the fact that the industrial growth of the 1950s and 1960s was historically unprecedented. There seemed to be no obvious reason why, if investment could be kept high and if government policies in the industrialized world were suitably Keynesian, the economic growth of those decades should not continue indefinitely — especially if sufficient resources could be allocated to research and development and to education. The absolute growth might perhaps decelerate once declining birth rates began to affect the growth of the labour force, but productivity and living standards would surely go on rising. Environmentalists, admittedly, were already casting doubt upon the world's ability to provide natural resources to fuel indefinite growth, but professional economists generally discounted their views, which were also without much political effect. The disappointments of the 1970s, therefore, were unexpected. Once again professional social science had not successfully foreseen the future.

Conclusion

This survey has avoided several fashionable topics. Nothing has been said about the question of foreign investment, because careful studies of the matter suggest that neither the absolute growth of foreign investment, nor the increasing proportion of foreign ownership or control in certain manufacturing industries, can possibly explain the deterioration in performance since 1971. Indeed, it was in the 1950s and 1960s, when that control was most obviously increasing, that the Canadian economy was performing comparatively well. On the other hand, there is no particular reason to believe that a further surge of foreign ownership, in and of itself, would do anything much to improve productivity, although insofar as it was accompanied by higher real investment it would tend to raise output and lower the unemployment rate. As for high-tech industries, the historical record suggests several reservations. No doubt, a wave of investment in such industries would raise output and employment. But it is hard to believe that the high-tech industries could ever be large enough in relation to the whole economy, or even in relation to manufacturing, for them to have any perceptible effect on the movement

of productivity and living standards, even if it is to be assumed that factor productivity is high, or growing rapidly, in these industries — an assumption that, in turn, is unverified and probably unverifiable.

Many people worry about our close involvement with the U.S. economy, but it is hard to see how this involvement can be blamed for a slowing of productivity growth or for rising unemployment rates. In the 1970s export volumes and prices moved comparatively favourably, in spite of the fact that our trade is heavily concentrated on the slowly growing U.S. market; at the same time, growth performance was worsening in all our external markets, and in every country from which we might hope to import technological knowledge. In the long run, it might appear to be a cause for concern that we do so much of our trade with the United States, one of the more slowly growing economies. The same problem, indeed, would have arisen if we had remained specialized in the export of wheat to the United Kingdom. But many of our export goods command worldwide acceptance, and if there are outlets beyond the United States, it is to be expected that we will be willing and able to serve these non-U.S. markets. Competitiveness will always be a problem; our present involvement with the U.S. market need not be, especially if we are willing to draw imports from supplier countries that can supply us more cheaply than the United States can.

The conclusions of our survey are to some extent negative. There is little reason to believe that some sort of cosmic structural change occurred in Canada during the 1970s, such that the poor productivity performance of that decade should be regarded as permanent. If there is a “closing time in the gardens of the West,”²² we need not conclude that it has arrived in the Dominion of the North. Some interesting and influential schemata, such as those of Kindleberger, Salter, Lewis, Kaldor, Boltho, and Beenstock, do not seem terribly applicable to the Canadian scene. There was no failure of investment during the 1970s, although higher levels of investment might well have raised employment levels while accelerating the growth of labour productivity. In terms of real magnitudes, furthermore, the slump of 1981–82 is explicable along very old-fashioned Keynesian lines.

Nevertheless, our study of the structural changes in the economy does prompt some gloomy reflections. An increasing proportion of the labour force works in industries where labour productivity has traditionally risen comparatively slowly, or perhaps not at all. That proportion is now strikingly high. Similarly, a remarkably high proportion of the labour force works in white-collar occupations, where productivity performance has often been thought uncertain at best. After all, if labour productivity really cannot be raised in the tertiary sector while that sector becomes the dominant employer of labour (58.3 percent of the total labour force in 1981), it is hard to avoid the suspicion that the rate of growth of labour productivity, and therefore, the rate of growth of living

standards, must tend to fall, other things being equal. Thus, unless there are some remarkable departures from the past pattern of technological progress, it is difficult to see how an economy that uses labour as Canada now does can possibly push up living standards and GNP in the 1980s and 1990s at the rates of the 1950s and 1960s. Fortunately there are plenty of signs that the pattern of technological progress is indeed changing; if so, the effects will surely be concentrated among clerical and managerial personnel, and perhaps to some extent among sales personnel; in these occupations, and in the industries that make especially heavy use of such occupations, labour productivity may rise much more rapidly in the next 20 years than in the last 30. Furthermore, the changing opportunities in international trade provide new and attractive opportunities to gain from trade, thus offsetting, at least in part, such sluggish characteristics of our domestic economy.

It has recently been suggested²³ that all the First World economies have become “more rigid” during the past 15 years, and that on a “rigidity continuum” Canada and the United States lie somewhere between Western Europe and Japan, the latter being the least rigid (in economic terms) of all the industrialized states. This is a thought-provoking but perplexing observation whose full import cannot properly be canvassed here. To the economic historian, of course, any “rigidity differences” between the 1950s and 1970s appear entirely insignificant by comparison with, for example, the differences that separate the 12th century from the 19th in Western Europe, or those that distinguish pre-Meiji (pre-1868) from modern Japan. It is also disquieting to recall that, when Western economists first began to study Japanese economic arrangements in the postwar years, they thought the Japanese economy hopelessly rigid. Criticism was directed especially at the “permanent employment” system, by which so many large Japanese firms hire their workers for life, and at the wage system, which seems to reward seniority and education rather than individual performance. Later research has been obliged to demonstrate that these “rigidities” proved to be strengths, not weaknesses.

Conversely, Britain’s coal industry once had a wage and employment policy that was splendidly “flexible.” The result, it now appears, 60 years later, was a legacy of bitterness that still bedevils that industry. Similarly, early in the 1920s much of the British automobile industry converted to a form of “payment by results” that was much praised at the time, because it linked earnings with productivity while rewarding enhanced effort.²⁴ By linking the individual worker’s reward so closely to job description and task definition, that system now appears to have been a main source for labour-management dispute and for rigidity of workplace practice, especially in the years since 1945; it may also have made managements reluctant to redesign their products, because even minor changes so often required a redefinition of norms throughout the

factory, with resultant pressure on wage differentials. On the other hand, in the late 1940s and early 1950s the French economy was much criticized, especially by American scholars, for its rigidity and inflexibility — just at the time when France was about to “take off” into a 20-year spurt of very rapid growth.

These historical observations prompt two reflections. First of all, “rigidity” or “inflexibility” may sometimes be in the mind of the beholder; second, “rigidity” or “inflexibility” has not always been an obstacle to rapid growth in output and productivity, while “flexibility” has not always proved consistent with either output or productivity growth. The sort of rigidity or inflexibility with which Ostry and Bernabè are concerned is a very special sort. In Western Europe, since 1970, it has become difficult or expensive to fire people, or even to lay them off, while at the same time it has been difficult or impossible to make real wage rates fall in response to the oil shock and other depressing developments. The result, not surprisingly, has been overmanning and losses in “sunset industries,” combined with waves of nationalization, subsidization, or both. But it would be hard to argue, in view of the plentiful supplies of young workers and women workers, and in view of the actual declines in manufacturing employment in Europe, that there is any general shortage of recruits for any “sunrise industries” that anyone can manage to find. Similarly in Canada and in the United States, although we do not have the same institutional barriers as in Western Europe, there have been losses, overmanning, and pressures for government aid or state takeovers, even though total employment rose strongly through the 1970s. By definition, the losses, bail-outs, subsidies, and concealed redundancies must depress the economy’s productivity performance. But in Canada, at least, it is hard to believe that the effect is a large one: in relation to the national economy, the relevant firms and industries are simply not large enough. We can imagine situations where Ostry-Bernabè “inflexibility” and “rigidity” actually does reduce the growth rate by depriving the growing activities of labour; we certainly cannot argue that any such thing happened in the 1970s, either in Europe or in North America.

Among economists, especially the “new neo-classicals” and those who work with long-run equilibrium models, there is a natural tendency to favour institutional arrangements that place the fewest obstacles to the working of the market mechanism. Hence their concern with “rigidity” and “inflexibility” in much broader terms than those we have just been discussing. With respect to wage setting and price setting there are well-known developments, especially in Western Europe but also in Canada, which have created many more “regulated prices” since 1945. But these new developments are, to some extent, responses to political, emotional, and psychological forces that the economist cannot simply wish out of existence. Through the democratic political systems of the

West, and also through pressure-group activity, all sorts of interest groups are able to achieve protected positions for themselves. These political realities are not likely to go away.

Naturally, liberals of all sorts, whether or not they are economists, will be anxious to attack the positions of entrenched privilege that nowadays manifest themselves through price management, wage management, and the control by vested interests of productive techniques, output levels, and trade-flows. Hence the barrage of criticism that can properly be directed against agricultural protectionism, market-management in foodstuffs, and the obstruction of LDC exports. But it is one thing to attack such privilege and wastefulness; it is quite a different thing to urge ordinary folk to run their lives in accordance with the abstractions of the economist's model. In the mid-1950s the Gordon Commission observed that the only solution for the Atlantic Provinces' problems was depopulation. The result was anything but encouraging to economists. Indeed, one might even argue that the later outpouring of "regional aid" was, to some extent, an indirect result of the political response to that comment.

Perhaps one should ask oneself what allocation of reformist effort will best serve the interest of ordinary people in the long run, as the economy accommodates itself to technological change and to differential market growth. However strongly one may feel about "inflexibility" or about privilege, it may perhaps be more important or more fruitful to concern oneself with the development of appropriate new technologies, with the appropriate level and allocation of new investment, and with the appropriate management of those service industries and white-collar occupations in which the service of the common weal can so readily become mixed with self-interest.

Furthermore, as the labour force ages, the much-desired "flexibility" may become harder to attain, and much less remunerative once attained. We have every reason to think that older workers have trouble learning new skills, and some reason to suspect they would be less productive than younger workers even if they could learn to perform new tasks at an acceptable level. Among economists, how many of the 60-year-olds can master the mathematical techniques that are second nature to the 25-year-olds? And of those who can do so, how many deploy the techniques effectively?

In the end, the question for policy is one of static versus dynamic efficiency. Economists have a special professional interest in demonstrating the ways various sorts of inflexibility, rigidity, or market power can create inefficiency in the allocation of resources. We spend much of our teaching effort in explaining such matters — generally on *ceteris paribus* assumptions that may or may not apply, and usually forgetting the general theory of the second best, by which solutions that are "inefficient" in the small can sometimes be shown to be "efficient" in

the large. But when anyone tries to measure the benefit from removing some inefficient arrangement, the resulting number is often surprisingly small. Nor would most historians assert that the removal of inefficiencies explains much of the remarkable improvement in living standards that has occurred since the end of the Second World War, or, for that matter, since the mid-18th century. It is the long-term processes of growth and development that make an economy efficient or inefficient in this dynamic, historical sense. These processes, in turn, appear to centre around the accumulation of capital, both physical and human, the development and diffusion of new methods and new products, the emergence of new trading patterns, and the gradual adaptation of the populace to new ways. In the Western world, even though the path of improvement has been anything but smooth or uninterrupted, in the long run the result has been a rising level of material well-being. We have no reason to suppose that the slowdown of the 1970s, or the slump of the early 1980s, marks a change in trend. But only time will tell.

Notes

This study was completed in October 1984.

1. The argument is diffused through Innis's earlier works. See in particular *The Fur Trade in Canada* (New Haven: Yale University Press, 1930) and *The Cod Fisheries* (Toronto: Ryerson Press, 1954); the theme also occurs in many of Innis's more casual writings.
2. H.A. Innis, "An Introduction to the Economic History of Ontario from Outpost to Empire." See Innis (1956, pp. 108–22).
3. The literature on this topic is a large one; in its modern form it begins with Ouellet and Hamelin (1962), and was carried further by Ouellet (1966); among the more important later contributions were those by Paquet and Wallot (1967; 1972a; 1972b). The debate continues.
4. The Ontario literature is less extensive than the Quebec literature; see in particular Jones (1946), and Gagan (1981).
5. This unpublished research, supported in part by the Ontario Historical Studies Series Board, will be incorporated in Ian M. Drummond, "Progress Without Planning, 1867–1941" (forthcoming), chap. 5.
6. Elaborated in Leibenstein (1978) but first noted by Leibenstein at a much earlier date.
7. Given some shape, although not resolved or concluded, by Harcourt (1972).
8. David Landes is the most prominent of the names in this body of literature. See also Kemp (1972).
9. Schumpeter introduced the distinction between invention, or new discovery, and innovation, or the first applications of new discoveries to production. See Schmookler (1966); Eltis (1973, chap. 6); Binswanger, Ruttan et al. (1978); Gold (1977); Firestone (1972); and Matthews (1973).
10. See below, the section on "Growth, Jobs and Deceleration, 1945–81."
11. To this generalization the work of Dales (1966) would be an important exception.
12. This section is a development, and to some extent an expansion and correction, of the survey in Bothwell, Drummond, and English (1981, chap. 2).
13. Here and elsewhere in this paper, unless otherwise noted, all types of expenditure are reported to constant 1971 dollars, and business fixed investment includes new housing construction.
14. On the uranium boom and its non-sustainable character, see Bothwell (1984).

15. For a general discussion see Maddison (1980).
16. Among the studies relating to the impact of the unemployment insurance system, and of the changes in that system, are: Beach (1982); Beach and Kaliski (1983); Courchene (1970); Cloutier (1980); Ferris and Plourde (1982); Fine (1976); Green (1976); Grubel, Maki, and Sax (1975a; 1975b); Hum (1981); Kaliski (1976); Maki (1977); Wallace (1974).
17. Ian M. Drummond, "Progress Without Planning, 1867–1941" (forthcoming), chap. 3.
18. See Kuznets (1966, chap. 3), for a summary statement of the definitions and patterns, and for a commentary on earlier views, as for example those of Clark (1940).
19. Reprinted in *Further Essays in Economic Theory* (London: Duckworth, 1978, pp. 100–130).
20. As summarized in Kindleberger (1967, chap. 1).
21. At least in the original formulation; however, Kaldor has somewhat retreated from his original emphasis on production conditions in the manufacturing sector. Kaldor originally argued in 1966 that the growth of GDP was closely related to the growth of manufacturing output, but not to the growth of output in other sectors; that in manufacturing, following what has come to be called "Verdoorn's Law," the growth of productivity was closely related to the growth of output; and that the growth of manufacturing output required increases in the manufacturing labour force, partly by running down the underemployment in agriculture. Stoneman (1979), who examined British economic growth over the period 1800–1970, argued that there was some support for Verdoorn in British manufacturing, but the labour supply had not constrained the growth of manufacturing output. Cornwall (1976) also rejected Kaldor's argument with respect to labour supply. With respect to the productivity patterns that Kaldor had found in Verdoorn, Rowthorn (1975a; 1975b) argued that there was really no strong evidence for these, partly because the one extreme observation — Japan — accounted for the bulk of the observed correlation between productivity growth and employment growth. Kaldor (1975) responded that he no longer thought the Verdoorn mechanism at all crucial; what mattered was that there should be plenty of labour, so that economic growth would be demand-induced, not resource-constrained, so long as profit and profit expectations were sufficient to produce adequate investment. This is, of course, a much simpler and more orthodox Keynesian position, although it does not at first sight appear consistent with Cornwall's view of things. Parikh (1978), in turn, argued that both Kaldor and Rowthorn had committed errors in statistical procedures, such that it was necessary to re-do the whole exercise in a simultaneous-equations model; when this was done, Parikh discarded Kaldor's hypothesis with respect to the significance of labour supply and it appeared that the rate of growth of manufacturing output was constrained by the rate of growth in demand for exports, and by the rate of investment. McCombie (1980) however, who examined a cross-section of countries for the period 1960–65, did attach some importance to the inter-sectoral transfer of labour as a factor raising overall labour productivity; he was, however, inclined to emphasize differences in the growth of demand for output as more basic forces in the explanation for differences in overall productivity growth. Returning to the question in the early 1980s, McCombie (1981; 1982) presented further arguments against Kaldor's surplus-labour hypothesis, and also concluded that the Verdoorn correlation between growth in productivity and growth in manufacturing was largely illusory.
22. The phrase is John Cornwall's. See his *Modern Capitalism* (1977, chap. 11).
23. By Sylvia Ostry, in a paper that will shortly appear in the 1983 *Transactions of the Royal Society of Canada*.
24. As explained in an unpublished workshop paper by Professor Wayne Lewchuk of McMaster University.

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Prices in the Postwar Period

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Introduction

This study traces the evolution in thinking on theories of price determination, concentrating on the post-World War II period. This long-run perspective is adopted in order to provide the reader with the historical context and an understanding of current issues.

The reason for this approach is simple. The consensus on the empirical reality of price rigidities in the face of nominal shocks is not matched by a consensus on a theoretical explanation for their existence. The result is that different paradigms at the macroeconomic level allow nominal income or money shocks to work through different channels with varying degrees of emphasis on the role of different types of expectations formation processes and different stylized stories for the existence of rigidities. Similarly, at the microeconomic level various avenues relating to derivation of optimizing rules for economic agents are being followed. Moreover, other researchers are attempting to find ways of linking models of optimizing behaviour at the micro level which have implications for relative prices to macro-based inertia models for absolute price. Thus, the next two sections deal with problems of methodology (intended for the specialist) and of defining price inflation. Section four reviews the historical evolution of research on price determination, and section five provides an overview of recent research in the price domain. There is a short conclusion, followed by appendices A–G that will be of interest primarily to the specialist.

In order to summarize the evolution of thinking on theories of price determination I have relied heavily on earlier surveys and other papers to clarify understanding of the major issues and lines of research. To

improve readability, references to specific papers and authors are minimal throughout although a limited bibliography is attached.

Macroeconomic Constraint on Price Level and Inflation

The sole purpose of this section is to emphasize, in as simple a manner as possible, that any model that purports to explain price level determination or inflation must investigate all elements of the economic system. A straightforward identity is a useful tool in determining whether a theory is complete or not. In the two subsections below this identity is manipulated just to show how it might serve as an aid in cross-checking the completeness of particular theories. Nothing more than this interpretation should be drawn from the identity and not all possible cases are considered.

A Non-Inflationary World

The suggested framework is borrowed from the equation of exchange but in its accounting rather than theoretical form. The identity, abstracting from indirect tax effects and changes in taste and technology, can be written for final output as:

$$MV \equiv PQ \equiv WF \quad (1)$$

The first part says that the amount of money in circulation in a particular time period, M , multiplied by the velocity of circulation (the number of times the money stock is turned over in final purchases) in the given time period, V , is identically equal to nominal expenditures (price, P , multiplied by constant dollar output, Q). The second part borrows from national income identities to state that nominal expenditure at market prices, PQ , is equal to nominal income at market prices (unit factor returns, W , multiplied by factor inputs, F).

To reiterate, relation (1) is solely an identity. Different models that purport to explain the real world determine different components of it (usually in a highly disaggregated manner) within the model (endogenous) using a set of equations, initial conditions and certain variables (exogenous) from outside the model framework. However, no matter the model, the interpretation of its solution from an economic viewpoint at any given point in time is constrained by this identity or some rearrangement of it.

In the classical model, real-side equilibrium is determined independently of money market equilibrium. Thus, for a given change in money supply the usual assumption of constant velocity implies a proportionate change in the price level. Since the real wage in the classical model is determined from the marginal product of labour, the nominal wage in the new equilibrium is just the real wage multiplied by the new price level.

Other models cast in the static framework have posited the ability of some factors (either wage or profit push) to increase their relative rate of return through exertion of market power (unions, oligopolistic firms, etc.) as a reason for a higher price level after the change in money supply has occurred. While the actual adjustment mechanisms in most models are somewhat more complicated, equation (1) reminds us that without money validation (a complementary change in M) the increase in elements of W might occur without any rise in P but with lower use of factor inputs, F , less output, Q , a change in velocity, V , or offsetting movements in other factor returns. Any model representing itself as a theory of price level determination would have to outline the process of adjustment from one comparative static point to another and ensure that all stock and flow conditions are met.

In a fixed exchange rate world it is possible to view domestic prices in a small open economy as the counterpart of world prices ($P = PFX * PW$) with various other elements of the identity adjusting to validate exogenously determined (to the domestic economy) world prices.

An Inflationary World

A variant of the simplistic framework above is used again here to demonstrate the point that explanations of the determination of the inflation process also have to be consistent with an overall constraint. This overall constraint can reflect domestic factors (monetary policy, wage setting policy) or foreign factors (depending on the form of the exchange rate regime).

The dynamic form of the above identity is:

$$\dot{m} + \dot{v} = \dot{p} + \dot{q} = \dot{w} + \dot{f} \tag{2}$$

where lower case letters indicate natural logarithms of variables previously defined and the dot above a variable indicates the time derivative.

At this stage it might be useful to incorporate productivity growth into the above example, with f taken as given so that factor use and supply are equal. The reason for considering the model with productivity growth is to demonstrate some of the interesting questions that might be generated depending upon what assumptions are made. Technical progress is introduced by letting

$$\dot{q} = \dot{f} + g \tag{3}$$

where g is rate of technical progress.
Then after substitution in (2) we have

$$\dot{w} = \dot{p} + g \tag{4}$$

which can be taken to assert that real wages grow with productivity. However, we do not know whether it is nominal wages or price inflation

or both that change. If the particular model under consideration takes nominal wage growth as given, perhaps in a short-run mode because of existing non-indexed contracts, or (in a longer-run mode) because of an exogenous wage-setting process, then (4) can be rearranged into

$$\dot{p} = \dot{w} - g \quad (5)$$

Equation (5) implies that a rise in exogenous technical progress could lead to a fall in the rate of price inflation, \dot{p} , but whether this occurs depends upon the reaction of the monetary authorities. If they let \dot{m} increase so that \dot{p} is unchanged then the change in nominal wage inflation equals the rate of technical progress.

Alternatively, \dot{m} can be taken as fixed with \dot{f} exogenous and \dot{v} constant (zero for simplicity):

$$\dot{p} = \dot{m} - \dot{f} - g \quad (6)$$

$$\dot{w} = \dot{m} - \dot{f} \quad (7)$$

Then, equation (6) implies that a rise in exogenous technical progress from g to g' leads to fall in the rate of price inflation of $(g' - g)$.

The point to be drawn from the above manipulations is that a specific observed fact, a rise in real wages, can reflect rather different underlying adjustment mechanisms, all of which may be consistent with the overall constraints of the system. The more general point is that a particular explanation of inflation that seems reasonable for a specific time period may have embodied in it an implicit assumption (for example, validation of any level of nominal income by the monetary authorities) that is not acceptable as a general proposition. Questions of dynamics, expectations, changing tastes, changing technology and a myriad of other sophistications that can be introduced do not change the fundamental point.

Definitional Considerations

This section focusses on the difference between an absolute price inflation and a relative price change. An absolute price inflation is defined to be a sustained rise in the price level (a depreciation of the monetary unit). Other definitions of inflation, especially in the early literature surveyed, are often based on explanations for the cause of the inflation, such as, inflation being a state of chronic excess demand.¹ However, Johnson (1967) considered these approaches theoretically wrong, stating that "the conditions to which these definitions call attention could exist without there being any inflation in the sense of a sustained rise in prices." Alternatively, later developments have shown that a steady state inflation (in the sense of a trend rate of growth of the general price level) can coexist with equilibrium between demand and supply, if the

actual rate of price increase is equal to the anticipated rate of price increase.

Reservations often expressed about the above definition of inflation have to do with identification and the choice of appropriate measures. Given that some set of prices or price indices is available, identification has both a temporal and a practical element. The temporal element has to do with arriving at a consensus as to the minimal time period price levels have to rise before the rise is considered to be sustained. The practical element is that it is possible that widely recognized supply-side shocks such as crop failures might cause prices to rise longer than the minimum time period but reflect more a relative price change (without long-run monetary validation) that has to occur than a contribution to absolute inflation. The choice of the actual measure(s) to be used presents another set of difficulties. Over a long time period various price indices can reasonably be expected to reflect an inflation if one exists, but in the early stages of an inflation a consistent picture need not emerge. For example, in the short run, current-period weighted measures such as the implicit price deflators for gross national product can be affected by shifts in weights normal for that particular stage of the cycle, while fixed weighted measures such as the consumer price index (CPI) can be affected by government indirect tax changes.

A relative price change means that the price for the factor or commodity under consideration has changed relative to some *numéraire*. A specific example is the crop failure mentioned above where the price of that particular crop rises relative to all other prices until the next harvest. That is, the relative price rises temporarily because of a short-term supply shortfall. A shift in demand to a particular product because of a taste change can lead to a change not only in the price of that product relative to prices of other products (at least in the short term; the long-term effect depends upon the long-run price elasticity of supply) but also in the relative price of the factors required to produce that product (again depending upon their price elasticity of supply). In response to economy-wide shocks, different rates of response of the various sectors in the economy can lead to relative price changes in a transition period, but only real shocks (changes in taste, technology, supply of natural resources, etc.) result in a different set of relative prices in the new stationary state relative to the previous one.

As alluded to above, relative price changes can affect the available measures of prices and their inflation representation and for some time. In Canada, the CPI measure of inflation often is affected by such things as transitory food price increases resulting from bad weather in the United States. Other examples would include the effect of energy prices on the CPI and of the terms of trade on the implicit deflator for gross national expenditure (PGNE).

Prices in Previous Periods

In this section I borrow heavily from earlier surveys of the prices literature to characterize the issues and lines of research in this area, concentrating for the most part on the post-World War II period. A particularly helpful approach, used most clearly by Johnson (1967), is to outline the influence of major historical episodes on ideas about inflation. This scene setting is followed by a summary for individual time periods (1950s, 1960s, and the first half of the 1970s) of the general inflation performance in Canada and the United States, a listing of some of the major issues that arose during the period and a capsule summary of some of the lines of research pursued during the period.

Historical Roots²

Johnson (1967) stressed that the inflations of World War I and afterward in continental Europe, especially the German hyper-inflation in the early 1920s, influenced ideas about the inflation process. The inflation financing of World War I reinforced the quantity theory approach to monetary problems and the resultant wage-price spiral spawned the idea that wages lag prices. This view was not generally validated for most inflations subsequently studied. Research on other historical episodes, such as the Spanish inflation of the 16th century, initially seemed to suggest the same thing, but this was refuted in a later study (Alchian and Kessel, 1959). Both the World War I inflation and the German hyper-inflation contributed to the ideas that budget deficits and money financing of government expenditure caused inflation. The German hyper-inflation also demonstrated that inflation had relatively adverse consequences on those whose income derived from interest, rent, salaries and other kinds of fixed income. Johnson went on to analyze the implications of these ideas for policy response to the Depression and the financing of World War II, but I turn now to examine the decade of the 1950s using the format described above.

The 1950s

The commodity price boom associated with the Korean War resulted in a substantial increase in price levels in the initial years of the 1950s in both Canada and the United States. However, price levels subsequently rose at a much more moderate pace with no particular trend in the rate of change. One issue in price theory during the 1950s centred on possible replacements for the classical quantity theory of money in the light of its failure to explain the depressions of the 1920s and 1930s. The determinants of the speed and stability of the inflationary process constituted

another area of investigation. In the later 1950s there was substantial debate about whether inflation was demand-pull or cost-push.

The particular line of research engendered by the first issue initially focussed on Keynesian explanations of inflation. This theory stressed income and expenditure flows rather than monetary stocks with the price level a function of the gap between aggregate expenditures and aggregate capacity at full employment (inflationary or deflationary gap). This demand approach to inflation in the goods market was used to investigate the behaviour of the aggregate expenditure curve at full employment and at successively higher price levels with a view to establishing the implications for stability. More complicated models incorporated detailed behavioural equations for the household, business, and government sectors and brought expectations and assumptions about money creation into the analysis. One major innovation for the analysis of inflation was the consideration not only of excess demand in the market for goods but also of that for factors.

With respect to the determinants of the speed and stability of the inflationary process, the research effort used first- or second-order difference equations to relate the price level or change in price level in one period to that in the previous period or two periods earlier, with parameters incorporating the precise behaviour assumed in the theoretical model. One example of the behavioural assumptions made in these types of models (still in the Keynesian mould) was a model with a rentier group having a fixed money income so that inflation erodes their real income to the benefit of other claimants to income. This model would reach a new equilibrium level only if enough real income can be taken from the rentier group to satisfy the other claimants. This example points up the essence of these models: the redistribution of real income to increase real saving is accomplished via the inflation process. It also reveals one of their major flaws, the arbitrary behaviour underlying the analysis. A more fundamental point not specifically dealt with was the assumption of unlimited idle balances or continued money validation embodied in these models.

The controversy over whether inflation resulted from demand-pull or cost-push reflected the rather different implications for policy response. If a sustained rise in the price level occurred because of a generalized excess demand, the appropriate policy response would be one of tightening by way of the macroeconomic levers of fiscal and monetary policy. If on the other hand, the market power of particular groups (oligopolies, unions, and other pressure groups) caused such a sustained rise, then specific policies directed at the processes of wage and price formation might be more appropriate.

One obvious difficulty with both demand-pull and cost-push as theories of inflation was the lack of consideration of the behaviour of the

monetary authorities. In an easy monetary environment this omission is unimportant, and it is possible to think of either approach as a theory of the mechanism of inflation. Another difficulty is the definition used of full employment. Full employment defined as that where product prices are stable (neither rising nor falling) then makes a demand-pull explanation of inflation a tautology. Full employment defined such that less-than-full employment and inflation can coexist requires explanations other than excess demand.

An alternative theory of inflation developed in the late 1950s was that of sectoral demand-shift. Given an operative assumption of downward rigidity of wages and prices generally, and with prices and wages allowed to rise in expanding sectors, a sustained rise in the aggregate price level can be achieved without general excess demand. The main weakness with this approach was, as with the others, the failure to investigate monetary preconditions. Furthermore, there was no serious effort to provide explanations of rational behaviour that would produce such asymmetries.

The prices literature, especially in the United States, had a structuralist orientation in the 1950s with particular emphasis on unions and the bargaining process. Little apparent attention was paid to the issue of why the implicit assumption of monetary validation required for sustained inflation was plausible. However, there was some revival of interest in the quantity theory of money in the form of a theory of the demand for money that led to work concerned with the role of money in generating inflation. Another item placed on the research agenda in the latter half of the 1950s stemmed from an empirical regularity discovered by A.W. Phillips of a negative relationship between the rate of wage increase and the unemployment rate in the United Kingdom.

The 1960s

In the United States, inflation increased substantially in the mid-1960s with the attempt to fund both increased social programs and the Vietnam War in an economy that was already performing at high levels. Given that Canada had fixed the value at which its currency could be exchanged for U.S. currency in mid-1962, a similar upward ratcheting in the Canadian inflation rate occurred in mid-decade.

In terms of major unsettled issues that were to be addressed in the 1960s, the questions identified by Robert J. Gordon (1976, pp. 189–90) are as appropriate as any. He divided them into two basic categories:

1. Why do the pressures on the monetary authority from the private and public sectors differ across countries at any given time?
2. What structural features of the economy influence the ability of the monetary authority to resist pressure? In particular, what portion of a

monetary contraction takes the form of a reduction in output as compared to a reduction in prices, i.e., what is the slope of the short-run supply curve . . . and under what conditions does the curve shift downward?

The research into the demand for money mainly took the form of investigating the empirical validity of the basic assumptions. The demand for money was assumed to be a demand for real balances. These real balances were expected to depend in a stable and predictable manner on the level of real income (or wealth) and on one or more opportunity cost (interest rate or expected inflation rate) variables. The existence of such a stable demand function would imply that changes in the quantity of money must lead to changes in one or all of the arguments of the function. Another relationship was required to describe the short-run adjustment process of these variables in terms of real income and prices.

Very early in the decade an attempt was made to give the Phillips curve relationship some theoretical content and to set it in a policy context. It was posited that the rate of change of wages and of the unemployment rate in a single labour market were positively and negatively related respectively to the excess demand for labour. With aggregation and the assumption that prices were “marked-up” over the wage rate in a stable proportion, a negative relation between inflation and the unemployment rate could be obtained. If the latter relationship was stable, policy makers could trade off inflation and unemployment. The result was that one major line of research in the 1960s involved the search for the empirical Phillips curve in different countries and evaluations of its stability.

A theoretical development late in the decade led to the perspective that there might be no stable long-run trade-off between inflation and unemployment. Unlike the labour market analysis outlined above which depended on the nominal wage rate, this later analysis had both the demand and supply of labour depend on the real wage. Employers were assumed to know the current actual price, while workers bargained in terms of the expected average consumer price level. Thus, as long as actual and expected prices differed, employment could change. However, in equilibrium the actual and expected price levels were equal and only one level of employment (and output) was possible — the associated unemployment rate was generally called the natural rate. The fundamental point here is that the part of “inflation” that induces output effects is really a change in the perceived real wage rate. This interpretation of the Phillips curve opened research into such areas as the calculation of the natural rate, the accelerationist properties of the wage equation, the microfoundations of macroeconomics, and intertemporal policy optimization questions. The only one of these of direct interest in

this paper is the microfoundations research initiative. Although most of these early papers dealt more with labour markets than commodity markets, some lessons can be learned that are applicable to understanding product price performance.

In the opening years of the 1960s an interpretation of the labour and commodity markets was developed that included price dispersion and allowed for returns to investigating wage (price) variability across space. With a positive cost to search, the result was a search model. During the final years of the decade several authors built search models of wage and price adjustment that incorporated the natural rate hypothesis. The focus of the research was on why the natural unemployment rate might be greater than zero and why a short-run Phillips curve might exist. A positive natural unemployment rate results, in these models, because workers and firms engage in a costly search process in a world of heterogeneous jobs and labour. The negative relationship between wage inflation and the unemployment rate emerges because workers voluntarily quit their jobs because of wage cuts in periods of slack demand for their firms' product. In addition to the dubious assumption that all unemployment was voluntary, these early microfoundations models yielded such counter-factual implications for the U.S. economy as counter-cyclical fluctuations in quits and accelerating deflation when unemployment stays above its natural rate. In addition, such common occurrences as layoffs and signs indicating "no help wanted" were unable to be explained within the context of these models.

The above research efforts pertain mainly to a closed economy, and in the 1960s and early 1970s one framework for analyzing open-economy inflation, the monetary approach to the balance-of-payments theory, received renewed attention. Essentially, this approach attributed world inflation to money growth in excess of real output growth. However, it enhanced the number of channels for the international transmission of inflation. In the mid-1960s large models allowed foreign demand to affect the domestic price level via the effect of higher exports on aggregate demand and through the appearance of import prices in the aggregate mark-up price equation. One of the channels added by the monetary approach in its simplest form was the "purchasing-power parity" assumption that all goods are tradeable at prices set in world markets. The other channel allowed domestic holdings of foreign reserves to increase as the higher price level raises the demand for money relative to the initial supply.

The price/wage literature of the 1960s made substantial progress in investigations into the areas relevant to the second category of issues outlined above (those dealing with the structural features of the economy). However, the mainstream of research seems to have had little to say about the first category (socio-political forces impacting on the monetary authority).

The First Half of the 1970s

Inflation, as measured by the rate of change in the consumer price index, attained double-digit levels in both Canada and the United States before mid-decade. Rising price levels in both countries coincided with a worldwide commodity price boom engendered by some shortfalls in supply for individual commodities and a coincidence of cyclical strength in most (Western industrial) countries. Of course oil was one of the commodities whose real price increased dramatically in that period.

One empirical issue of the period specific to the widely used markup price equation was the direct role of excess demand rather than the indirect effect via the wage-unemployment relation. An emerging theoretical issue was the optimizing basis for the markup price equation. However, the major issues in the transmission mechanism embodied in the typical price and wage equation(s) in this period were still related to the Phillips curve. A substantial empirical issue had to do with whether the expectations-augmented Phillips curve demonstrated properties consistent with the natural rate hypothesis including the corresponding sub-issues of obtaining plausible estimates of price expectations and of the natural rate of unemployment. Another major issue centred on whether the Phillips curve could be exploited by policy makers. These macroeconomic concerns strengthened the rationale for a continued search for an optimizing framework at the microeconomic level. Continuing theoretical and empirical issues included the underpinnings of the functional form of money demand, the appropriate definition of money, the stability of empirical estimates of the money demand function, and its use in a policy of disinflation. The international transmission of inflation comprised another issue of some import.

An assessment in 1970 of the theoretical and empirical work on price equations in the 1960s led to the suggestion that greater attention be paid to the formal constraints on the long-run equilibrium price equation imposed by the particular production technology assumed (neoclassical price behaviour). The emphasis of this proposal was on relative prices (prices relative to costs). It was realized, although not examined in any depth, that the demand side had to be incorporated and that there had to be some process by which short-run prices could be modelled. Some of the reasons advanced for the deviation of short-run from long-run behaviour centred on market structure, costs of adjustment and uncertainty. With respect to market structure one longstanding insight (Arrow, 1959) held that a theory of price setting had to be based on an analysis of monopolistic or quasi-monopolistic behaviour, since all perfectly competitive firms are price takers. The implication is that in disequilibrium all firms must be quasi-monopolistic.

Two theoretical models were developed in the early 1970s that utilized this insight to investigate particular ways that microeconomic considera-

tions about relative price levels might be relevant to macroeconomic relationships between output, employment and movements in the general price level. One expected-present-value maximizer approach (Phelps and Winter, 1970) used the basic competitive model but with a finite (infinite) elasticity of demand in the short run (long run), while the other (Barro, 1981, chap. 8) assumed an expected-present-value maximizing monopolist. In the first model the firm faces a dynamic demand function where the rate of change of sales is a function of its own product price relative to the market average price for the product. The rate of price adjustment is a function of the differences between the actual and expected average price and the actual and expected equilibrium quantity, and is homogeneous of degree one in the expected rate of inflation. The second model posits a stochastic demand function and costs of price adjustment that are traded off against the profits expected to be lost via maintenance of a disequilibrium price. With demand dependent only on the price of the firm's own output, aggregation leads to the rate of price change being a positive function of excess demand. These particular lines of theoretical research were not complemented by empirical research in the first half of the decade.

Another strand of theoretical research examined costs of adjustment as factors in the existence of contracts in "customer" (product) markets with resultant slow price adjustment versus "spot auction" markets characterized by price flexibility and continuous market clearing. Parallels with the search literature mentioned above are obvious since the core hypothesis is that customers will pay a premium to deal with regular suppliers and so avoid costly search. Suppliers, on the other hand, try to maintain stable prices over time so that customers will not have an incentive to engage in search activities. The implicit contracts (which remain implicit because of negotiation and legal costs) do allow suppliers to increase prices because of a permanent increase in costs.

Uncertainty about the form of the demand or supply functions might result in price stickiness as firms try to interpret the signals from the market. Risk-neutral firms will move to the certainty equivalent optimal price, while risk-averse firms are likely to adjust more slowly in an uncertain environment than under known conditions. The formal literature in the area during this time period again focussed on the labour market and attempted to rationalize wage rigidity and layoffs without assuming, for the most part, heterogeneity or information costs. As an aside, note that the key assumptions were that employees are more risk averse than employers and that there are contractual arrangements (explicit or implicit) which constrain behaviour. Firms then maximize profits by minimizing the variability of income to their workers.

The empirical research on the Phillips curve during this time period is not dealt with here, but one major insight about the interpretation of the Phillips curve is outlined because of its implications for the practical

relevance of the price-wage transmission mechanism. The insight built upon the late 1960s' microfoundation search models alluded to earlier. The essential element of this story is that market participants have difficulty in interpreting whether a price or wage change reflects a change in the absolute price level (due to a different money supply, for example) or a relative price change. This difficulty occurs because of incomplete information. Thus a change in the absolute price level might lead to actions premised on the belief that relative prices have changed. For example, less unemployment might result from lower levels of search unemployment as workers believe that their real wages are higher when, in fact, all prices have risen because of the higher money supply. A trade-off may then exist until agents correctly interpret what is happening. Policy makers can only exploit the trade-off of more output (less unemployment) for more inflation if they have an information advantage over other participants in the various markets that comprise the economy. If agents know what policy makers are likely to do they can anticipate that the effect of an increased money supply, for example, will be higher nominal magnitudes everywhere. Only the unanticipated actions of policy makers can then affect real magnitudes. The importance of this insight, despite some of the strong statements that subsequently came to be associated with it, was that it forcefully reminded open-minded participants in the debate about how the economy operates that empirical regularities for a short span of history are not general theories. Without a clear understanding of the rules governing agents' behaviour, important changes in factors influencing that behaviour may fail to be recognized.

Attempts to test the above hypotheses with their reliance on expectations really involve a test of the joint hypothesis of the underlying model and the expectations-generating mechanism. Initially, the expectations mechanism was posited to be adaptive and could be taken to imply that agents made systematic errors about expectations. Another approach that finally received a great deal of attention in the 1970s, although it had been posited early in 1960s, emphasized the rationality of economic agents. It is argued that the expectations of these agents will be unbiased estimates of the actual stochastic economic process being anticipated, and any errors in expectations will thus be random with mean zero. A large literature evolved and flourished through the 1970s around all aspects of this hypothesis.

Expectations processes also play a role in monetarist models of inflation, another line of research that received increasing emphasis in the early 1970s. In a closed-economy framework these models generally embodied two assumptions: the accelerationist theory, and endogenous expectations. The first assumption allows the change in the rate of growth of the money supply to have real effects, but only for a short period of time determined through the second assumption via the length

of time it takes expectations to adjust. The accelerationist label comes from the fact that, as expectations adjust, it takes an acceleration in inflation and in the rate of monetary expansion to maintain a given level of monetary stimulus in the economy. However, monetarists never intended to imply that even an accelerationist policy could succeed indefinitely. Expectations being endogenous, they would not remain adaptive for long under conditions of accelerating inflation. The rate of inflation is determined by the rate of growth of the money supply. Research into a monetarist model for an open economy followed the monetary approach to the balance of payments mentioned above. The relevant money supply is that of the world — the sum of the money supplies of individual countries. Under a system of fixed exchange rates, the money supply of an open economy, comprised of international reserves and domestic credit, is endogenous and will be determined by world money supply. The standard assumptions of this theory (fixed exchange rates, full employment, integrated commodity and goods markets), along with the assumptions of an internationally determined price level for traded goods and a rate of interest determined abroad, imply that the money supply in a small, open economy cannot be controlled by the monetary authorities. Attempts by the monetary authorities to change the domestic money supply through domestic credit creation can be offset by the actions of other agents that impact on the balance of payments.

The simultaneous determination of inflation and unemployment in a macroeconomic model, although having earlier roots, began to receive a great deal of emphasis in the 1970s. The three building blocks of the essential structure of these models encompassed: specification of the rate of inflation; specification of how inflation expectations are generated; and specification of how excess demand is determined. Substantial differences in detail occurred between models, but most of them produced a response to monetary and/or fiscal policy that initially impacted on real output and employment and that affected prices only after some lags.

No outline of the lines of research followed in this period and earlier would be complete without mention of structural models of inflation. One model attributed the long-run trend of a rising price level to: (a) relatively slower productivity growth in the increasingly important service sector as opposed to the industrial sector of the economy; (b) different price and income elasticities for the products of the two sectors; (c) nominal wage growth determined for both sectors by the fastest growing sector; and (d) downward inflexibility of prices and nominal wages. The result of these assumptions is a permanent cost pressure in the service sector that, in combination with markup pricing, leads to cost-push inflation. The relative supply price change in favour of the service sector produces inflation because of the high income elasticity and small price elasticity for the products of this sector. Arguments of

fairness, relative wage bargaining and long-run mobility, and interchangeability of factors are all used to justify the uniform money wage increase.

The Scandinavian model of inflation developed in the early 1970s utilized the essential elements of the structural model to outline the transmission mechanism of inflation under fixed exchange rates from the world market to a small open economy (price-taker in world markets). The economy is envisaged as having two sectors: the exposed sector produces traded goods for which prices are established on world markets; the sheltered sector produces non-tradeables, commodities that are not traded internationally. Uniform wage increases in both sectors, a higher rate of productivity growth in the exposed sector, and markup pricing in the sheltered sector lead to cost-push inflation in that sector. Aggregate domestic inflation is then a function of world inflation and the difference in the rate of productivity growth between the traded and non-traded sector weighted by the share of the sheltered sector. Subsequent work suggested interpreting the latter as a supply price equation and merging it with a Phillips curve type relation to represent demand conditions. The latter in an open economy includes the output (unemployment rate) gap term, the expected rate of inflation in the exposed sector, and the growth rates of labour productivity in each of the exposed and sheltered sectors. One interpretation of this model hinges on the exogenous determination of inflation. Then the model determines the level of aggregate demand consistent with the rate of inflation.

In the early 1970s a particularly useful classification of the international transmission of inflation under a fixed exchange rate regime was proposed (OECD, 1973). The four identified channels comprised: (a) price effects; (b) demand effects; (c) liquidity effects; and (d) international inflationary expectations and “demonstration” effects. Both the monetary approach to the balance of payments and the Scandinavian model allowed for goods arbitrage to equate the price of domestic and foreign goods after adjusting the latter by the relevant exchange rate. The implication is that the inflation rates of different countries would converge if it were not for the existence of non-traded goods. Demand effects in the fixed-exchange-rate world can be thought of in the context of a Keynesian open-economy multiplier with all countries near full employment. Attempts to divert excess demand from one country to another sustain an inflationary demand pressure, since all countries are near full employment. The liquidity effects channels are as alluded to earlier for the monetary approach to the balance of payments. The final channel is probably the most speculative in that it encompasses such things as wage performance in one country directly influencing wage behaviour in another and the effect of the behaviour of international prices on the formation of domestic price expectations.

The price/wage literature during this period showed a definite ten-

dency toward considering the inflation-unemployment nexus in the context of an overall macroeconomic model. Moreover, the role of expectations and the implications for price and output of different types of expectations formation mechanisms received much greater emphasis, although little progress was made in analyzing precisely what determined expectations. International transmission mechanisms for inflation were important areas of research. Much greater emphasis was given to establishing the microfoundations appropriate to perceived reality.

Current Theories of Inflation

The pre–World War II era was dominated by the quantity theory of money in its interpretation as a determinant of the price level. During World War II and the immediate post–World War II years, the Keynesian inflationary/deflationary gap analysis was used. The latter part of the 1950s, and the early 1960s saw research efforts focussed upon differentiating between demand-pull and cost-push as models of inflation. These one-time price level change models became models of inflation by explicit or implicit incorporation of a process of expectation adjustment and the assumption of money validation.³ Two developments in the 1950s that were to occupy much research time during the next two decades were the reformulation (by Milton Friedman) of the quantity theory of money as a theory of the demand for money, and the discovery of an apparently stable inverse relationship between the rate of growth of wages and unemployment in the United Kingdom (by A.W. Phillips). The former theory introduced the expected rate of price change as a determinant of the velocity of circulation and regenerated the arguments that it was the money stock rather than the income flow (money accommodated) that determined the price level and real economic activity. The Phillips curve was grafted onto the Keynesian *IS-LM* model (a Neo-Keynesian theory). The resultant model, so its proponents argued, was capable of tracing the impact on inflation and real output of non-monetary impulses (with supportive monetary policy). Later in the 1960s and through the 1970s the important role played by expectations in the determination of subsequent inflation and output effects from an impulse of whatever origin was recognized and investigated in great depth. In this way, developments that, five years earlier, would have been described as evidence of cost-push rather than demand-pull inflation (coexistence of inflation and recession) were linked to previous episodes of demand-pull through the process of revisions of expectations of inflation. Structuralist models of the cost-push variety, although certainly not in the mainstream of recent macroeconomic research, received some attention in the form of the expanded Scandinavian model. Moreover, some of the reasons advanced in support of inflation inertias in the Neo-Keynesian model, such as concern with relative wages, sectoral (demand shift)

inflation, and localized market power, have a definite structuralist element.

The general tendency noted above in reviewing the developments in the research on price determination and inflation over time was toward a complete macro model with careful attention to formation of inflation expectations. Another tendency was toward establishing the theoretical microeconomic underpinnings for behaviour consistent with that observed at the macroeconomic level. A brief summary of the recent main lines of research at both the macroeconomic and microeconomic levels is outlined below.

Macroeconomic Models and the Price-Output Adjustment Process

All the major theoretical macroeconomic models contain the proposition that sustained inflations require monetary validation. Their main differences, for our purpose, exist in the way the model economy responds to transitory and permanent changes in nominal variables. The intent here is not to provide a detailed specification of the models but to outline the stories they tell and the crucial elements in those stories. The models that are discussed are: the cost-push (included solely for completeness), the monetarist, the Neo-Keynesian, a single-equation reduced form, the New Classical and the New Keynesian.

In the **cost-push model** one of the factor returns is considered to be determined by elements exogenous to the model. For example, nominal wages might be arbitrarily set by workers at a new higher level (in the absence of any changes in productivity) because of the market power they have generated for themselves through joining together in unions. Assuming normal supply and demand curves, the effect of this would be to shift the supply curve of labour vertically in the wage rate–employment plane, implying a higher wage level and lower output. If the money supply was expanded to validate the wage increase, the demand curve would also shift vertically, and the final equilibrium in the initial round would be at a new higher wage level and the same level of employment. A markup price equation homogeneous of degree one in unit labour costs would result in an equivalent proportionate change in the price level, and there would be no real wage gain. With other prices and costs moving as well, the homogeneity of degree one could be considered in a wider sense. When workers realize that real wages are unchanged, a new round would start and a sustained rise in wage and price levels could occur as long as the monetary authorities continue to validate them. Otherwise, the result would be lower output and employment and somewhat higher wage rates and prices (the situation for a transitory or no validation). A similar story could be told for a profit-push inflation.

A simple **monetarist model** for a closed economy is presented in appendix A. The actual rate of inflation equals the expected rate of inflation adjusted positively for the deviation of nominal income growth from trend nominal income growth and the deviation between actual and full employment capacity output. The real output growth equation incorporates the same two deviation variables as in the inflation equation in addition to trend real output growth. The coefficients on the nominal income growth deviation are constrained to sum to one over the two equations, while the capacity level term has the same coefficient but of opposite sign in each equation. Actual nominal income growth is a function of expected nominal income growth and the deviation of money growth from trend nominal income growth weighted by a function of the relative change in the velocity of money with respect to the interest rate. The expected rate of inflation is a function of the difference between the trend rate of growth of nominal and real income. An adaptive expectations scheme is used for adjusting trend nominal income growth.

For a higher-than-expected increase in the autonomous rate of growth of money, actual nominal income growth increases relative to expected nominal income growth with part of the effect on inflation and part on real output. The higher the level of capacity utilization, the larger the impact effect on inflation and the smaller the effect on real output. In the long run, for a permanent increase in money growth, actual and expected nominal income growth equal the exogenous money supply growth, and the expected rate of inflation is higher by the change in money growth. A transitory unanticipated change in money growth will fade out gradually.

Modification of the monetarist model for an open economy depends upon the exchange rate regime. In a flexible exchange rate world, purchasing-power parity in the exchange rate equation would make the exchange rate another channel in the adjustment of prices to a domestic money supply change. In a fixed exchange rate world, the domestic money supply would be considered endogenous, and prices would be determined from abroad. More specifically, attempts by different monetary authorities to pursue independent policies would be individually offset by movements in the balance of payments, but the sum of the money supplies of different countries would form the relevant exogenous world money supply. The adjustment process has to be modified, however, to reflect deviations in domestic credit creation and the balance-of-payments and international reserve channels. In particular, the world money supply would depend on each country's attitude toward holding other countries' liabilities in its international reserve position.

The **Neo-Keynesian model**, like the Keynesian model of macroeconomic textbooks, stresses an asymmetric response of prices and wages to changes in aggregate demand. However, it is wage inflation,

rather than the nominal wage level, that is viewed as “sticky” in the downward direction. The transmission mechanism for nominal income changes is through aggregate demand directly to wage (and sometimes price) inflation. Moreover, not all nominal income changes have to have their origins in changes in the money supply, although non-monetary impulses have to be validated. In addition to rigidities in various markets because of explicit and implicit contracts, price expectations are considered to be formed adaptively, at least in part because of a backward-looking inertial component. As a broad characterization of these types of models one can view the aggregate demand curve as coming from the standard *IS-LM* framework adjusted to incorporate price expectations where relevant (in the nominal interest rate terms). The kinked, upward-ratcheting, aggregate supply curve of the Keynesian models is replaced by the non-linear (the asymmetry of slower adjustment on the downside) expectations-augmented Phillips curve. An equation for expectations of price inflation (formed adaptively) completes the system. For a small open economy under a flexible exchange rate, a purchasing-power parity determined exchange rate equation could be added. The effect of transient and permanent nominal income shocks on the time path and long-run responses of the price level and real output in these types of models depends mainly on the homogeneity properties of the price-wage-exchange rate sector. However, the short run almost always will show an output response greater than that for prices, with the responses to the transitory and permanent shock identical over corresponding time periods. The homogeneity properties will determine whether a long-run trade-off will appear to exist.

A **single-equation reduced-form model**, which resembles in specification an aggregate supply curve (see appendix E) and which is a summary representation of a model that embodies elements of the monetarist and Neo-Keynesian models, has been strongly advocated by Robert J. Gordon as appropriate for examining the historical stability of price-quantity adjustment to a nominal income shock in the short run. Essentially, Gordon posits a relationship similar to an aggregate supply curve, which for identification requires a unit elastic aggregate demand curve or exogenous nominal demand. The specification of the estimating form has price inflation as a function of its own lagged value (partial adjustment), adjusted nominal income growth (the growth in nominal income less the growth in trend real output), and the gap between the level of actual and trend real output. With an exogenous trend growth in real output (this is not a condition usually imposed), inflation grows at the same rate as adjusted nominal income. This model is not a model of inflation so much as a model of the adjustment process given a nominal income change which can have its origins in a change in the money supply or in a non-monetary demand-side impulse validated by the

money supply. Other than the length of the adjustment process, there is no particular difference between the effects of transitory and permanent shocks.

Both the **New Classical** and **New Keynesian models** emphasize the supply side mechanism of aggregate output and employment response rather than the excess-demand mechanism used in the Neo-Keynesian model. Relative price changes that lead to similar movements in the supply of goods and services are focussed upon. This channel is obtained by stressing intertemporal variables. That is, relative price shifts induce substitution of current aggregate supplies of goods and services for future supplies. Suppliers in local markets compare their observed current price or wage with the expected price or wage at alternative times and places. The expected price or wage is formed rationally in that suppliers know the model that describes the economy and utilize all the information available to them efficiently. While they have only lagged information on the general price level at any point in time, suppliers have current information on their own markets and information on how the local price level has related to the general price level in the past. In this framework, a one-period, transient, unannounced nominal income shock is perceived, in part, as a relative price change and induces an intertemporal substitution on the supply side. A permanent, previously announced, nominal income shock is incorporated into the agents' information sets and will change all prices by the relevant amount but have no effect on output. The more variable is nominal income in the economy, the greater will be the agents' tendency to view all nominal changes as being in the general price level and not in their relative price. This latter point has implications for interpretation of the Phillips curve (see appendix F). An empirical regularity that is left out of this general outline, but that has to be addressed, is the serial correlation of output movements. This is where the main differences between the New Classical and New Keynesian models occur. One way that this has been approached in the New Classical models has been to assume a lag of more than one period in information acquisition and the presence of other point-in-time variables like capacity utilization. The New Keynesian models introduce overlapping contracts of more than one period, so that a portion of the economy cannot react immediately to new information which they are assumed to have.

The bottom line on the above macroeconomic models is that they are not theories of inflation. They do incorporate mechanisms by which changes in nominal demand get allocated between changes in price levels and changes in real outputs. The particular mechanisms for the most part are not derived from well-understood and widely accepted optimizing rules. Moreover, in the absence of any such derivation, recent historical experience, while stimulating a lot of exciting research, seems to have led to more divergent views (or perhaps more strongly

held contrary views) as to the underlying story, even if it is not formalized.

Microeconomic Underpinnings

The main concern in this section is with some of the recent research that tries to establish optimizing behaviour for the factors considered responsible for the slowness of price response in the face of nominal income changes. A major difficulty with the microeconomic/macroeconomic link for this purpose is that microeconomic demand and supply curves derived from maximizing behaviour are always homogeneous of degree zero in all nominal magnitudes. Since the intent here is only to give an indication of the lines of research followed recently, the focus is on three areas: optimal contracting theory; the integration of price and inventory decisions; and an attempt to use asynchronization of price decisions to derive the relation between relative price inflexibility and absolute price level inertia.

Recent contract theory is distinctive in that it considers implicit as well as explicit contracts. Although the labour market receives substantial emphasis in the contracting literature, obvious parallels have been drawn for customer product markets. Contract theory tries to address the questions of why contracts exist, why there appear to be substantial variations in employment (and inventories and unfilled orders in product markets) and a sluggish response of wages (prices), and whether a purely monetary disturbance can have real effects. Some possible short answers are: there are mutual benefits to be derived from contracting in particular situations (employer-employee, customer-seller); adjustment of production (sales) costs through layoffs (inventories and layoffs of sales staff) are easier to make than changes in wages and prices; and contract theory is concerned with the responses of firms and workers to disturbances perceived by them to be real. With respect to layoffs, several points can be made: they apply to only a part of an organization's work force; they can be cheaply monitored; and it is difficult for labourers to ascertain that their marginal productivity is relatively low. Furthermore, layoffs are usually temporary and do not generally require a costly negotiation process (notification of customers of changed prices). Particular lines of research in the contract literature have investigated the use of contracts to spread risk, the "agent-principal" problem, and the cost involved in labour market transactions. In the first approach, a labour contract is treated as a contingent asset. A practical example is the case where firms are less risk averse than workers and use a labour contract to guarantee workers against income fluctuations over the business cycle at the price to the workers of a lower average wage. In the "agent-principal" situation, the worker is the employer's agent in accomplishing the assigned tasks with a long-term relationship mutually

beneficial when it is costly for the employer to monitor the worker's performance. The cost-of-adjustment approach stresses the training, evaluating, and administrative costs incurred by the firm and the moving, involuntary leisure, and other costs of the workers as capital costs that should be amortized over a period of time.

The literature on the integration of price and inventory decisions and related work that incorporates the fixed capital stock tries to formalize the manner in which a firm's short-run price may differ from its long-run price. One strand of the literature considers the situation when output is storable. The differential behaviour of firms arises because of different marginal costs of holding inventories in combination with the type of demand shocks (transitory or permanent) that occur. The form of the inventory cost function (ranging from very convex to linear) determines the reactions of output, price, and sales to inventory stocks. A "partial adjustment" specification for inventory investment is used in at least one model with desired inventories derived as a decreasing function of the current demand shock. The overall approach is explicitly intertemporal, with the focus on planning rather than calendar time. The behaviour of an individual firm is conditioned by relations between expected values of marginal costs, marginal revenues and the shadow value of inventories and an equation for optimal inventory holdings. Another strand of this literature attempts to fill the perceived gap in short-run price policies left by a static neo-classical price model. To do this, an intertemporal model of firm behaviour is developed that explicitly integrates decisions on prices, finished goods inventories and the capital stock. It is argued that the latter two items both have to be incorporated because they represent different kinds of stock adjustment. Finished goods inventories are perceived as buffering unexpected changes in demand, while capital as a quasi-fixed input can limit the firm's production response. The firm is assumed to be an expected present-value-maximizing monopolistic competitor (for its share of industry orders). Gross output is adjusted down to a net output measure because of costs of adjusting fixed capital and holding inventories. The general rationale in this type of model for a different short-run than long-run optimal price centres on gaps between desired and actual levels of inventories and the capital stock. Moreover, in this model the firm's short-run markup increases with measures of demand pressure (expected demand-inventory and expected demand-capital ratios) and falls with factor-input prices and inventory-holding costs.

As mentioned in the introduction, the link between promising developments in the microeconomic literature to explain relative price inflexibility and a macroeconomic explanation of the inertia of nominal prices is tenuous at best. Some initial work (Parkin, 1982) has been undertaken on the choice theoretic and equilibrium properties of Taylor's staggered wage-contract model. The behaviour of rational maximizing agents with

respect to price and output decisions is examined in the context of choosing between being a price taker all the time or a price setter over some fixed, optimally chosen period. The conditions for choice of each alternative and the equilibrium allocation of agents between the two methods of trading are derived. One crucial result from this specific purpose model is that the properties of the output-inflation trade-off are determined as parameters of the money supply process. Another recent approach (although precedents exist) examines the role that asynchronisation of price decisions might take in explaining price level inertia and macroeconomic fluctuations. Mechanical models of asynchronisation are developed with the crucial assumption for generation of asynchronisation being that of more than one period price (wage) decisions taken at different times. They are then used to demonstrate how the effect of a movement in aggregate demand initially creates an inconsistency in relative prices which sets up an adjustment process that in concert with asynchronised price (wage) decisions affects the nominal price adjustment. The weakness of this approach is that there is no theory of asynchronisation, so that the dynamic effects of a change in regime are difficult to predict.

This latter point is similar to the criticism of the adjustment processes in most macroeconomic models that initiated the search for micro-underpinnings. However, the research being criticized is closer to, in the sense of the previous avenues explored, identifying whether a macroeconomic adjustment process can be justified from microeconomic optimizing rules. Without a major breakthrough though, much more work is required before a definitive conclusion can be reached.

Conclusion

The historical evolution of the research effort to improve our understanding of aggregate price level determination and the absolute inflation process is toward integrated macroeconomic models. These models generally incorporate elements to determine the rate of price inflation, inflation expectations, and excess demand. Inflation expectations usually influence the outcomes in the price inflation and excess demand determination sectors. Excess demand affects price inflation, which in turn may enter into the process of generating inflation expectations. These broad elements do not prevent, as we have seen, quite different explanations of the macroeconomic adjustment process to shocks of various kinds, in particular nominal income shocks. One class of models posits downward rigidities on prices and wages and adaptive expectations. For these models, adjustment lags might stem from a combination of such factors as implicit and explicit contracts in many markets, backward-looking inertias (concern with wage relativities, the adjustment to past cost increases of regulated prices, product prices where

market power exists), and different sectoral responses. Another class of models allows expectations to be formed rationally but incorporates such institutional inertias as multiperiod contracts, with the result that nominal shocks can have real effects. One class of models posits that agents form expectations rationally but take time to gather information, and thus might mistakenly perceive a relative price change when an absolute price change has occurred. There is an element of plausibility to the stories that underlie each of these sets of models.

Some of the strands in the microeconomic underpinnings literature have been discussed along with the need for a link between relative price inflexibility and absolute price inflation inertia. The lack of an adequate theoretical justification of such a link does not mean that one does not exist. Thus, the stylized facts stated in O'Reilly, White, and Ford (1985) included exploratory reaggregations of data for broad market classifications. These broad market classifications were: those that ranged from more likely to be "customer" (price setter) to more likely to be "auction" (price taker) markets; those where prices and profit margins were more likely to be institutionally controlled and those where they were not; and markets where some form of market power might exist. In this study, I have mentioned several lines of research investigating situations where relative price inflexibility might be optimal.

Appendix A

A Monetarist Model for a Closed Economy

$$\pi_t = \pi_t^* + \alpha(y_t - y_t^*) + \gamma(\log X_t - \log X_t^*) \quad (1)$$

$$x_t = x_t^* + (1 - \alpha)(y_t - y_t^*) - \gamma(\log X_t - \log X_t^*) \quad (2)$$

$$y_t = y_t^* + \frac{1}{(1 - \beta R)}(m_t - y_t^*) \quad (3)$$

$$\frac{d}{dt}(y_t^*) = \beta(y_t - y_t^*) \quad (4)$$

$$\pi_t^* = y_t^* - x_t^* \quad (5)$$

where π_t, π_t^* are the actual and expected rates of inflation, y_t, y_t^* are the actual and trend rates of growth of nominal income, x_t, x_t^* are the actual and trend rates of growth of real income, X_t, X_t^* are the actual and trend (full employment) levels of real output, m_t is the autonomous rate of growth of the money supply, and $R = (\partial V/\partial i) \cdot i/V$ is the relative change of the velocity of money as a function of the interest rate.

If the rate of growth of the money supply deviates from the expected

rate of growth of nominal income, it leads to a difference between actual and expected nominal income from (3). This difference from (1) and (2) can have both inflation and real output effects. In addition, capacity utilization impacts positively and negatively in equations (1) and (2) respectively. The adaptive process of expectation adjustment in (4) leads to $y_t^* = y_t = m_t$ eventually with higher actual and expected inflation and no change in expected real output growth.

Source: As borrowed and modified by Frisch (1977) from M. Friedman’s “Theoretical Framework for Monetary Analysis,” pp. 193–238, *Journal of Political Economy*, March/April 1970, 78(2).

Appendix B

Quasi-Reduced-Form Representation of “Complete Short-Run Models of Inflation, Output and Employment”

The equation system

1. The rate of inflation

$$\Delta p = \alpha(L)x + \beta(L)\Delta p^e + \gamma(L)Z \tag{1}$$

2. Inflation expectations

$$\Delta p^e = \lambda(L)\Delta p + K(L)Z \tag{2}$$

3. Excess demand

$$x = \delta(L)(m - p) + \phi(L)\Delta p^e + \mu(L)f + \psi(L)Z \tag{3}$$

where Δp is the actual rate of inflation, Δp^e is the expected rate of inflation, Z is a vector of exogenous variables, p is the natural logarithm of the price level, x is excess demand, $\bullet(L)$ is general distributed lag, m is the natural logarithm of the money stock, and f is a vector of fiscal policy variables.

Conditions for no long-run trade-off between inflation and unemployment are:

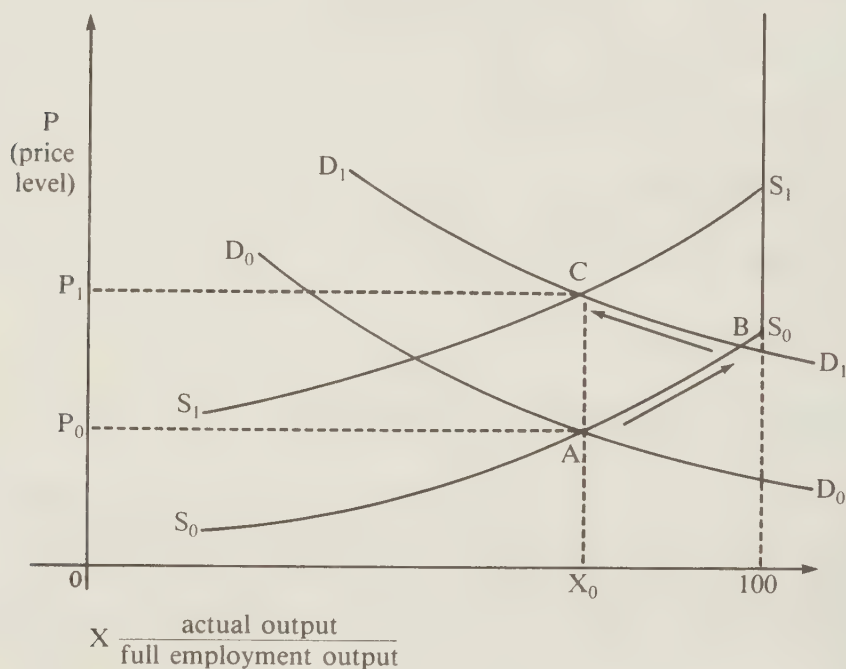
- excess demand must be homogeneous of degree zero in nominal magnitudes;
- inflation expectations must be homogeneous of degree one in their effect on actual inflation; and
- in the long run, inflation expectations must be unbiased.

Source: This appendix comes from Laidler and Parkin (1975).

Simple Diagrammatic Representation of One-Shot Changes in Demand and Supply

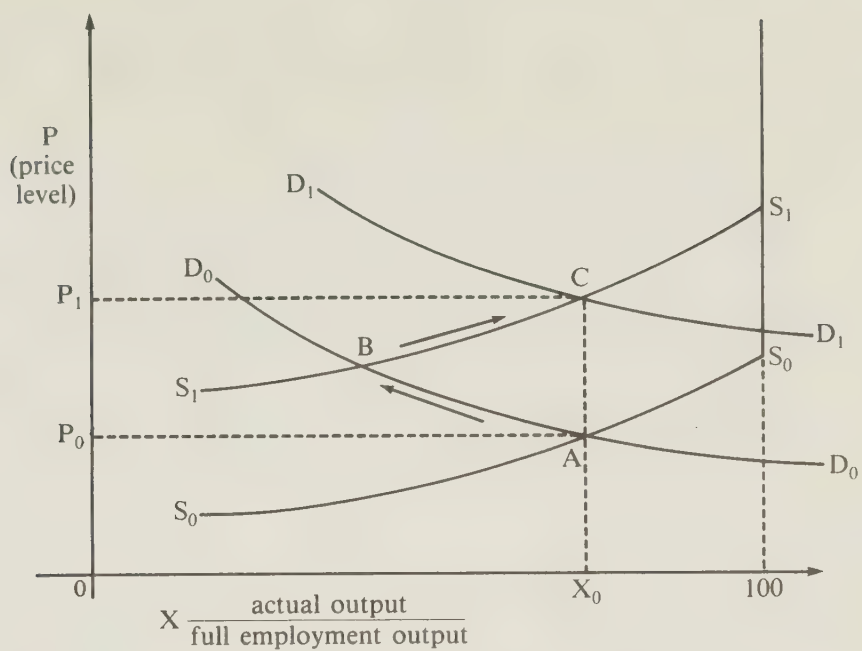
The initial demand (D_0D_0) and supply (S_0S_{00}) curves intersect at point A with price level, p_0 , and actual output relative to capacity, x_0 , below full capacity. After the increase in demand, because of higher money supply, for example, the system moves from point A along the original supply curve to point B , a situation of a higher price level and output. After producers adjust to the new situation, the supply curve shifts upward to S_1S_1 , with a new higher price level, P_1 , but the same relative output, x_0 , as in the initial situation.

FIGURE 2-C-1 An Increase in Demand
($D_0 D_0$ to $D_1 D_1$)



Higher costs lead to a vertical shift in the supply curves of firms to S_1S_1 from S_0S_0 . The result at B is a higher price level and lower output relative to those at the initial equilibrium, A . If the money supply rises to validate these increased costs, the demand curve shifts to D_1D_1 from D_0D_0 and the final equilibrium is at C with a higher price level and the same output as at A .

FIGURE 2-C-2 A Decrease in Supply
(S_0 S_0 to S_1 S_1)



Appendix D

The Scandinavian Model of Inflation

The Basic Model

Assumptions:

- Fixed exchange rate
- The economy is a price taker for goods produced in the exposed sector
- A constant profit markup is added to unit labour costs to arrive at the price level in the sheltered sector
- Exogenous variables are: π_w , λ_e , λ_s , and α_s (defined below).

1. Exposed Sector

$\pi_e = \pi_w$ (1)

$w_e = \pi_w + \lambda_e$ (2)

2. Sheltered Sector

$\pi_s = (w_s - \lambda_s)$ (3)

$w_s = w_e$ (4)

3. Aggregate inflation

$$\pi = \pi_w + \alpha_s(\lambda_e - \lambda_s) \quad (5)$$

where π_w , π_e , π_s , π are the world, exposed, sheltered, and domestic rates of inflation respectively;

w_e and w_s are the rates of growth of nominal wages in the exposed and sheltered sectors respectively;

α_s is the share of the sheltered sector in output; and

λ_e and λ_s are the rates of growth of labour productivity in the exposed and sheltered sectors respectively.

An Extended Model

Supply-price

$$\pi = \pi_w + \alpha_s(\lambda_e - \lambda_s) \quad (1)$$

Demand-price (Phillips Curve)

$$\pi = f(u, \pi_e^*, \lambda_e, \lambda_s, \alpha_s) \quad (2)$$

where u is an excess demand variable and π_e^* is expected inflation in the exposed sector.

One possible interpretation for this system allows the rate of inflation to be determined exogenously through equation (1), given α_s . Then equation (2) could be used to determine the level of aggregate demand consistent with that rate of inflation.

Source: This section draws on Frisch (1977).

Appendix E

A Single-Equation Reduced-Form Inflation Model

Nominal income growth identity

$$y \equiv p + q \quad (1)$$

Adjusted nominal income

$$\begin{aligned} y - q^* &= p + (q - q^*) \\ \text{or } \hat{y} &= p + \hat{q} \end{aligned} \quad (2)$$

Specification of estimating form

$$p_t = \alpha \hat{y}_t + b p_{t-1} + c \log(Q/Q^*)_{t-1} + dZ \quad (3a)$$

$$\log(Q/Q^*) = (1 - \alpha) \hat{y}_t - b p_{t-1} + (1 - c) \log(Q/Q^*) - dZ \quad (3b)$$

$$0 \leq b \leq 1, c \geq 0$$

where y is nominal income growth, p is price inflation, q is real output growth, q^* is the trend or “natural” growth rate of real output, Q and Q^* are the levels of actual and trend real output, and Z is a vector of dummy and supply variables.

Equation (3a), given that α is constant over time, is viewed as a model of the short-run adjustment of prices to exogenous nominal demand or a unit elastic aggregate demand curve. For equation (3a) to identify the aggregate supply curve, all shocks must be interpreted as demand shocks.

Source: This appendix draws on Gordon (1980) and (1982).

Appendix F

The Lucas Supply Curve

The supply curve of the representative firm is expressed as:

$$y_i = c(p_i - p_i^e) + y_i^f, i = 1, \dots, n \quad (1)$$

where y_i is the i th firm's production,

p_i is the i th firm's price,

y_i^f is the i th firm's normal level of production,

p_i^e is the i th firm's perception of the average price level (the “general” price level) elsewhere in the economy, and

c is a parameter.

From equation (1), a firm produces more if the price of its product rises relative to the general level of prices in the economy. However, a general

price rise that is fully perceived by all firms does not alter production since p_i and p_i^e move together. Only when a firm misperceives a general price change as a relative price change for its product can Phillips curve type correlations (a positive correlation between production and inflation) result. The difficulty with this type of argument is that the empirical evidence seems to require firms continually to misperceive a general price rise as a relative price rise.

Taylor (1983), whose insights underlie this section, uses a scatter diagram with the deviation of the general price level from a normal or expected level of prices, \hat{p} , on the vertical axis and the deviation of the firm's price level from the same normal price, \hat{p} , on the horizontal axis as an expository tool. Then, if the scatter of points is in a tight band around the 45° line, the firm should interpret all price changes as being mainly a general price change. The greater the deviation from the 45° line, the more reasonable it is for the firm to act as if a relative price change has occurred.

Algebraically the least squares regression equation is:

$$p - \hat{p} = b(p_i - \hat{p}) \quad 0 \leq b \leq 1 \quad (2)$$

Taylor goes on to derive b as equal to $\sigma_p^2 / (\sigma_p^2 + \sigma_\epsilon^2)$, the variance of the general price level over the sum of the variances of the general price level and the variability of relative prices. Then, as the variability of relative prices gets larger b gets smaller so that in the limit, $\sigma_\epsilon^2 = \infty$, a change in the individual firm's own price says nothing about the general price level.

By substituting $p_i^e = \hat{p} + \sigma_p^2 / (\sigma_p^2 + \sigma_\epsilon^2)(p_1 - \hat{p})$ into equation (1) Taylor obtains

$$y_i = c(1 - b)(p_i - \hat{p}) + y_i^f \quad (3)$$

which aggregates to

$$y = \gamma(p - \hat{p}) + y^f \quad (4)$$

where, $\gamma = c(1 - b)n$.

An expectations-augmented Phillips curve can be derived from (4) by inverting, subtracting the aggregate price level from both sides and interpreting p as a logarithmic price index. Thus,

$$p - p_{-1} = \hat{p} - p_{-1} + \lambda(y - y^f) \quad (5)$$

where $\lambda = \gamma^{-1}$.

But (4) and (5) are equivalent, allowing the relationship between the slope parameter b and the variability of prices to be interpreted in terms of the slope of the Phillips curve. Hence, an increase in the variance of overall prices increases λ , the slope of the short-run Phillips curve, given that λ is an increasing function of b . This equation captures both the long-run vertical Phillips curve ($p = \hat{p}$ implies $y = y^f$) and the short-run positive correlation between output and price.

Keynesian and Marshallian Market Adjustment Processes

Keynesian (fix-price) and Marshallian (flex-price) commodity markets coexist in the real world. The broad characteristics of these markets allow producers in Keynesian markets to influence their prices in the short run with the effect of demand changes working through inventory and sales to output shifts and price (and cost) changes. However, in Marshallian markets producers are price takers, with the effect of demand changes working via the stockholding function of active traders to generate price shifts and output (and cost) changes.

Scarfe (1977) argues that the differences between a Keynesian and Marshallian system are inherent in the structure of the systems rather than in the short-run assumptions for the Keynesian model of roughly fixed money wage rates and sectoral output capacities. He compares the systems shown in appendix Table 2-G1 and itemizes the similarities and differences. Briefly his points are:

1. Equations M-3 and M-4 are identical to equations K-3 and K-4.
2. Price change expectations in M-7 are those of traders or middlemen who hold inventory stocks as opposed to the sales expectations in K-7 of firms that produce flow outputs.
3. These price change expectations in M-6, rather than sales expectations as in K-6, have a positive impact on corresponding desired stocks (rate of interest, r , has a negative impact in both cases).
4. Prices change in M-5 rather than quantity outputs as in K-5 when desired and actual inventories are different.
5. Quantity outputs adjust to the discrepancy between actual (demand) prices and flow production costs (or supply prices) in M-1 and M-2 rather than prices adjusting to output-capacity ratios and unit labour and material costs in K-1 and K-2.

Scarfe emphasizes that the central idea behind the Keynesian model is the assumption that the cost function essentially determines the direction of price movements in a disequilibrium situation with the demand function determining the direction of output movements. That is, cyclical movements in output tend to lead cyclical movements in prices and stocks as opposed to the Marshallian model where cyclical movements in prices tend to lead cyclical movements in output and stocks.

Source: For derivations and greater detail the reader is referred to Scarfe (1977, chap. 11), upon which this section draws heavily, and Tobin (1976).

APPENDIX TABLE 2-G1 Comparison of Keynesian and Marshallian Systems of Price Formation

Keynesian Adjustment Process	Marshallian Market Adjustment Process	
$\ln p^* = (I-A)^{-1} \{ \ln v + A(\ln q - \ln k) + C(\ln w - \ln E) + B' \ln p \}$	$\ln q^* - \ln k = A^{-1} \{ (I - A) \ln p - c(\ln w - \ln E) - B' \ln p - \ln v \}$	K-1 M-1
$D \ln p = \gamma(\ln p^* - \ln p)$	$D \ln q = \gamma(\ln q^* - \ln q)$	M-2
$e = P^{-1} B P q + f$	$e = P^{-1} B P q + f$	M-3
$Ds = q - e$	$Ds = q - e$	M-4
$q - e^* = \mu(s^* - s)$	$\theta = \mu s^{-1}(s^* - s)$	M-5
$s^* = H(e^*, r)$	$s^* = H(\theta^*, r)$	M-6
$De^* = \lambda(e - e^*)$	$D\theta^* = \lambda(\theta - \theta^*)$	M-7

where $p = p_t, p^*, \theta, \theta^*, q, q^*, e, e^*, s, s^*, f, k, r, w, E$, and v are $n \times 1$ column vectors of actual prices, desired or target prices, actual proportional rates of price change, expectations of price change, actual output, desired or target output, quantities sold, expected sales, actual stocks, desired stocks, final demands, capital stocks or capacities, the rate of interest, wage rates, Harrod neutral technological levels and constants respectively.

$A, C, \gamma, D, P, \lambda$, and μ are $n \times n$ diagonal matrices of capital input coefficients (a_j), labour input coefficients (c_j), price adjustment coefficients, differential operators, sectoral prices, expectational adjustment coefficients, and stock adjustments coefficients. B is the $n \times n$ matrix of input-output value-share coefficients for materials inputs and H is a general functional form.

Notes

This study was completed in April 1984.

I thank John Sargent and Bill White for their encouragement and guidance in the project of which this paper was one working document. I thank my colleagues at the Bank of Canada, in particular David Rose and Pierre Duguay, for their constructive criticism of earlier drafts of this paper. I alone am responsible for the final version of the paper.

The Research Department of the Bank of Canada undertook the preparation of the study "Price Flexibility and Business Cycle Fluctuations in Canada: A Survey" for the Royal Commission on the Economic Union and Development Prospects for Canada. This paper was a working document for the study. The views expressed are those of the author; no responsibility for them should be attributed to the Bank of Canada.

1. For various other definitions of inflation and caveats relating to actual measurement, the reader is referred to Johnson (1967) and Bronfenbrenner and Holzman (1963).
2. The main sources for this section are Johnson (1967) and Bronfenbrenner and Holzman (1963).
3. Acceptance of the Radcliffe Committee Report's rejection of the significance of money might have been behind some of these models. However, the presumption in all modern theories is that a sustained rise in money is a necessary and sufficient condition for an ongoing expansion of nominal income.

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Price Flexibility and Business Cycle Fluctuations in Canada: *A Survey*

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Introduction

In 1984 the Canadian economy had just emerged from the worst recession of the postwar period. This experience quite naturally raised questions about the factors leading to the severity of this recession and, in particular, the role played by certain structural characteristics of the Canadian economy. One focus of attention has been a commonly held presumption of macroeconomic theory (sometimes described as "Keynesian") that price rigidities in an economy may exacerbate the effects on output of nominal shocks. The argument can be succinctly made by considering a reduction in the money stock. Most economists would agree that, in the long run, the effects of such a reduction would be neutral in that equilibrium in the economy would be restored by a proportional reduction in all prices and no (or almost no) changes in quantities. If prices changed instantaneously, the output effects would be small in the short run as well. However, if prices adjusted slowly for whatever reason, the real money supply would fall and, to clear the money market, interest rates must rise and real output must fall. While eventually prices would fall to restore the real money stock to its original level, there would be real output costs during the period of adjustment.

This argument supporting a high degree of price flexibility in the face of nominal shocks provided the primary motivation for a research study at the Bank of Canada. This survey summarizes results presented in the 21 individual papers prepared in this study (including O'Reilly, 1985, which appears earlier in volume 20) and listed in the attached bibliography of working papers. Reference to these papers is given by author name followed by the paper's number in square brackets. Any or all of

the background documents listed are available on request by writing to the address given.¹ A section of selected sources (references by author and date) refers to other papers relevant to this study prepared either at the Bank of Canada or elsewhere.

In the second part of this survey we lay out some facts *ex post* pertaining to the nature of the relationship between prices and cyclical movements in output during the post-1950 period in Canada. Particular attention is paid to establishing whether the relationship between prices and output in the recession phase of these business cycles appears to have changed over time. The working papers referred to in this section have been couched as far as possible in “model-free” terms. This is not to say that implicit theorizing has been rigorously excluded, since some basic economic framework was required to select and make sense of the data. However, no attempt has been made to discriminate between the alternative explanations for the observed phenomena discussed later on in this study. Attention has also been paid to measuring the degree and the stability of the relationship between output fluctuations on the one hand and profits, real wages and income shares on the other. It is at least conceivable that cyclical developments relating to factor shares may also play a role in explaining output fluctuations.

In the third part of this survey, we present alternative theories and empirical evidence about the process of price determination in Canada. There seems to be relatively little dispute about long-run considerations. The general level of prices is ultimately governed by the money supply (domestic or world depending upon the exchange rate regime), while relative prices are determined by the interrelated forces of demand and supply in each market. With respect to the short run, however, there are competing paradigms of price determination with associated implications for the responsiveness of output and employment to economic shocks of various sorts. For expositional purposes, it is useful to describe these alternatives as the Monetarist, New Classical, New Keynesian and Neo-Keynesian schools of thought, though we also refer below to the hazards of making rigid distinctions. The discussion and empirical evaluation of these alternative theories proceed in two steps. First, a review of the literature shows the evolution of thought about price determination and output fluctuations in industrial economies over the postwar period. This review concludes with some direct tests of alternative theories. Second, we consider a wide range of empirical models of the price determination process in Canada using postwar data. Although some of this work surveys existing literature, much of it has been prepared specifically for this Royal Commission.

In the fourth part of the survey, attention is directed more specifically to the implications of increased price flexibility when the economy is subjected to nominal shocks. Our methodology has been to shock variants (assuming more and less price flexibility) of the Bank of

Canada's two structural models of the Canadian economy, RDXF (a relatively large quarterly model) and SAM (a relatively small annual model). Although the results observed are model specific, it is worth noting that the two models do in fact have quite different structural properties. Common conclusions about the desirability of price flexibility based on common dynamic properties in two such dissimilar models may then be of particular significance.

The line of argument pursued in this study would seem to lead directly to a general policy conclusion: if price rigidities can be identified, structural reforms to reduce them should be undertaken. However, the scope of the paper does not extend to recommendations as to how this might be accomplished, a still more complicated issue. As a prerequisite, not only the existence of price rigidities but also their source would need to be identified. For example, institutional rigidities affecting prices (overlapping wage contracts, implicit price contracts between producers and consumers, etc.) would call for a different response than expectational rigidities based on (say) adaptive price expectations or a misreading of the intentions of the monetary authority. Second, even to the extent price rigidities with an institutional basis could be identified, it would have to be recognized that these institutional arrangements have in many cases been entered into freely by economic agents and likely play a useful role. Structural changes recommended on the basis of the "macro" benefits outlined above should be designed to reduce "micro" costs as well. Third, care would have to be taken that structural changes recommended to increase price flexibility overall did not result in undesirable (i.e., cycle-enhancing) movements in relative prices when the economy was subject to either real or nominal shocks. Finally, as a practical matter, an agenda for structural change would have to be constructed. Assuming that the initiative for change comes from government, initial efforts might concentrate on raising price flexibility through changing legislation or government regulations which currently reduce such flexibility.

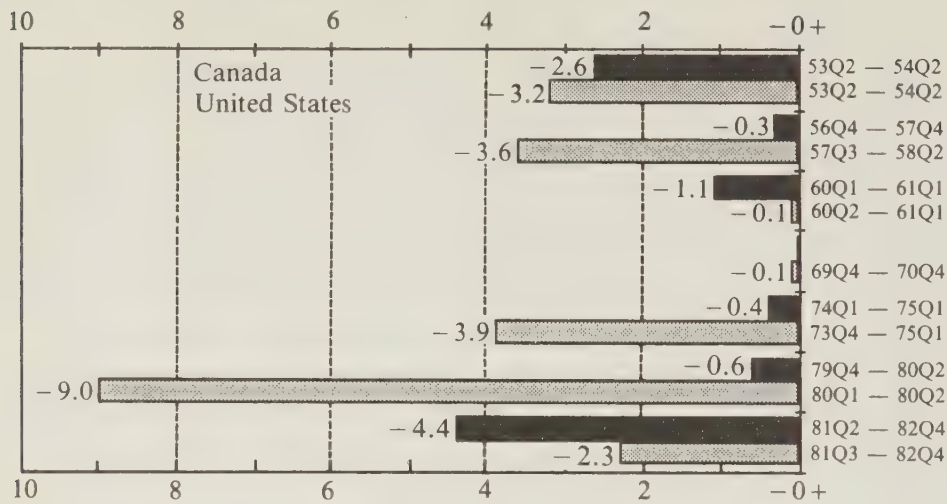
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Relationship between Prices and Business Cycles

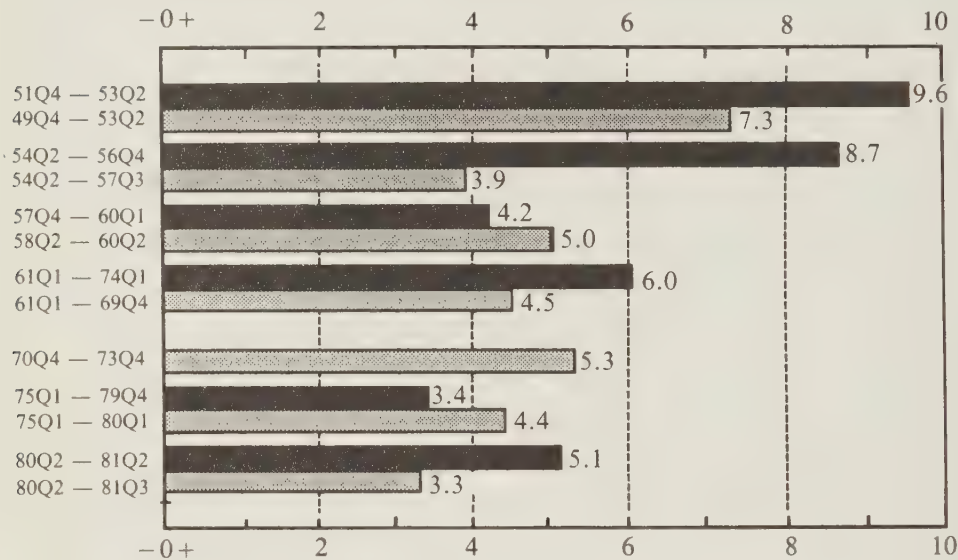
Two closely related papers (Ferley, O'Reilly and Dunnigan [W5] and Armstrong [W2]) investigate the post-1950 movement of prices in Canada. Ferley and Dunnigan [W6] extend some of this work to the period 1914–50, though this historical analysis is severely limited by the data available. Particular emphasis is put on changes in the relationship between business cycle fluctuations and movements in prices. The Canadian business cycles identified in figure 3-1 are those dated by Statistics Canada on the basis of aggregate production data and a diffu-

**FIGURE 3-1 Comparative Cyclical Performance in Real Output
Canada Versus United States**

Peak to Trough Percentage Change at Annual Rates



Trough to Peak Percentage Change at Annual Rates



Peak to Trough Percentage Change

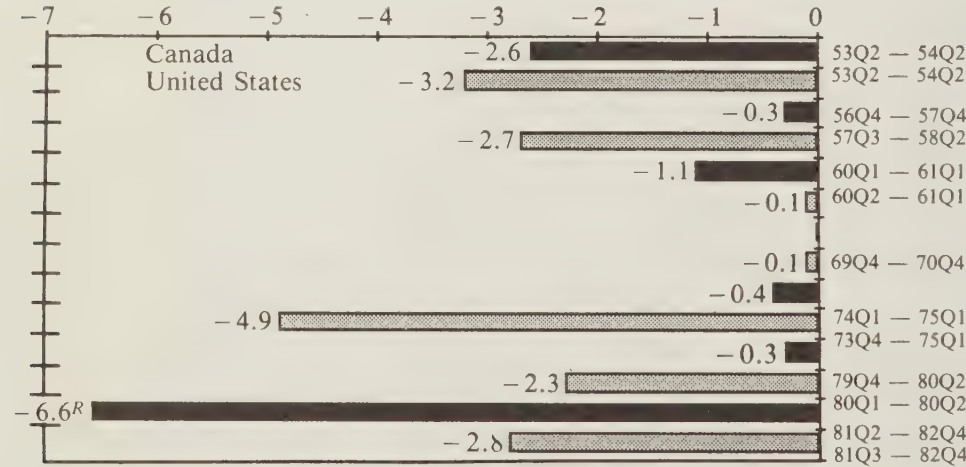
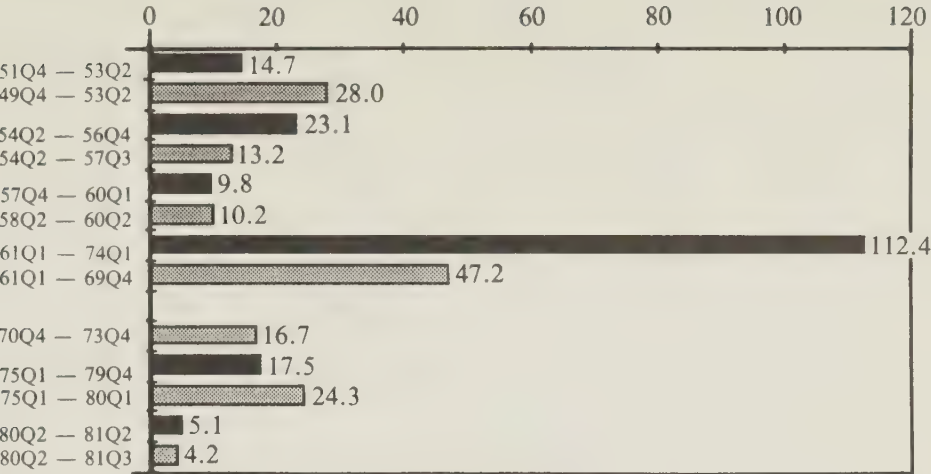


FIGURE 3-1 cont'd

Trough to Peak Percentage Change



sion index as described by Phillip Cross (1982).² The price series considered are defined in growth-rate terms rather than levels. As figure 3-2 makes clear, inflation has been trending upwards through most of the postwar period implying that phases of the business cycle have been more closely associated with increasing or decreasing inflation than with price level increases or declines.

FIGURE 3-2 Canada/U.S. Comparisons

The gap between actual and potential as a percentage of potential constant dollar gross national expenditure

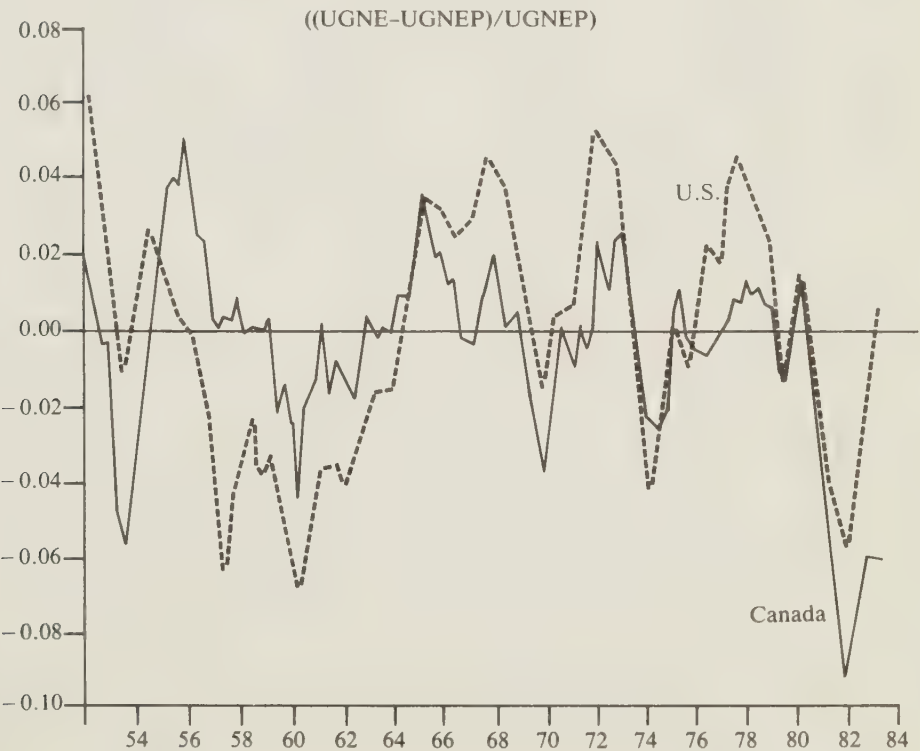
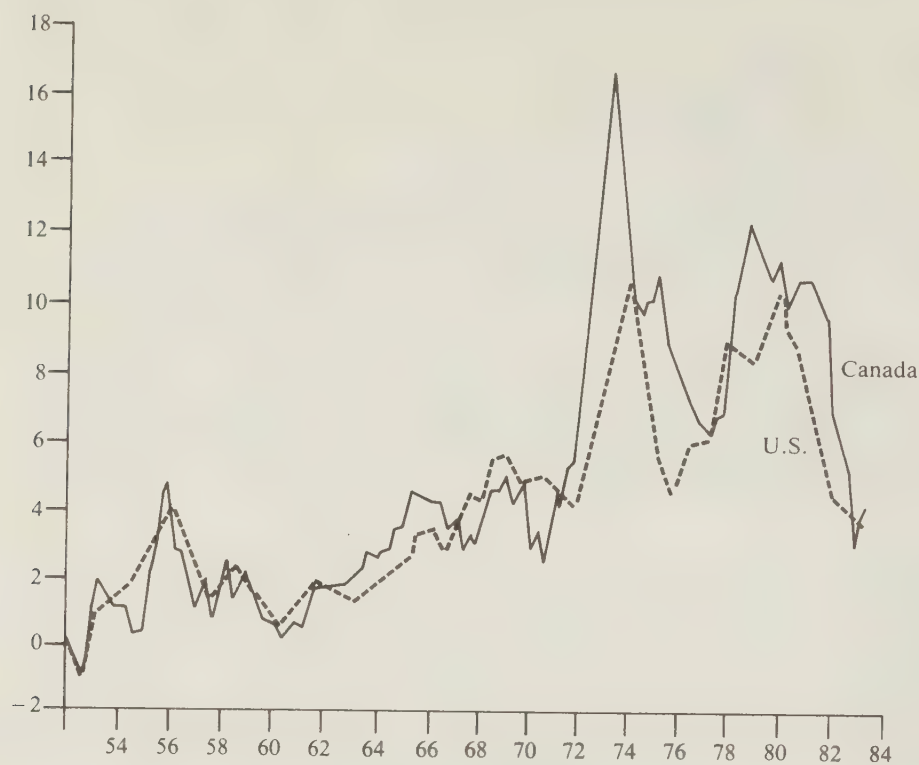


FIGURE 3-2 cont'd

The four quarter rate of change in the implicit price index for GNE



The four quarter rate of change in the consumer price index

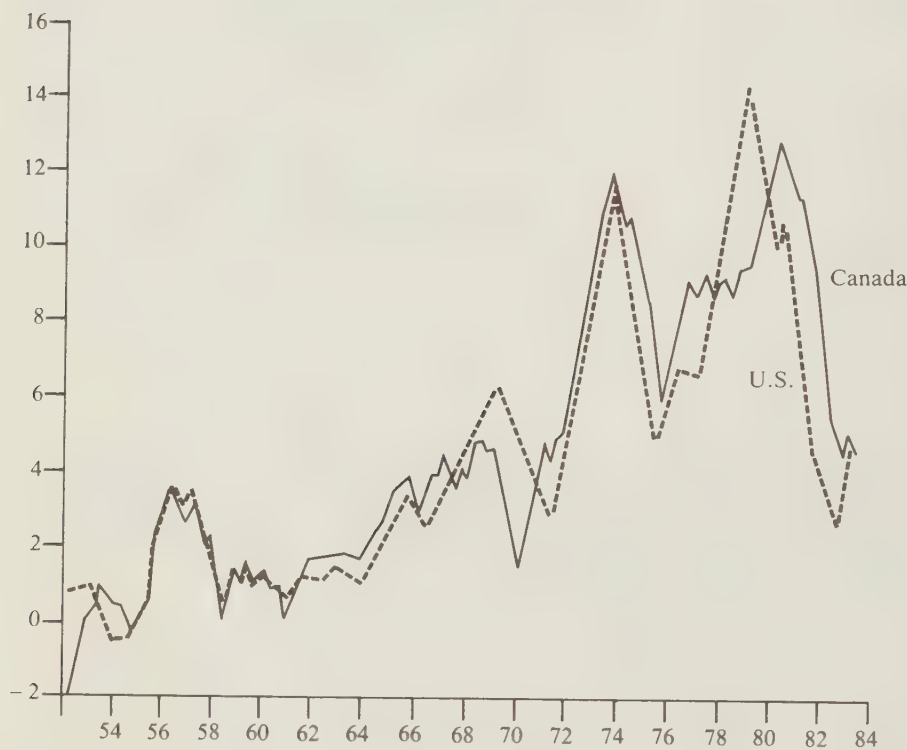
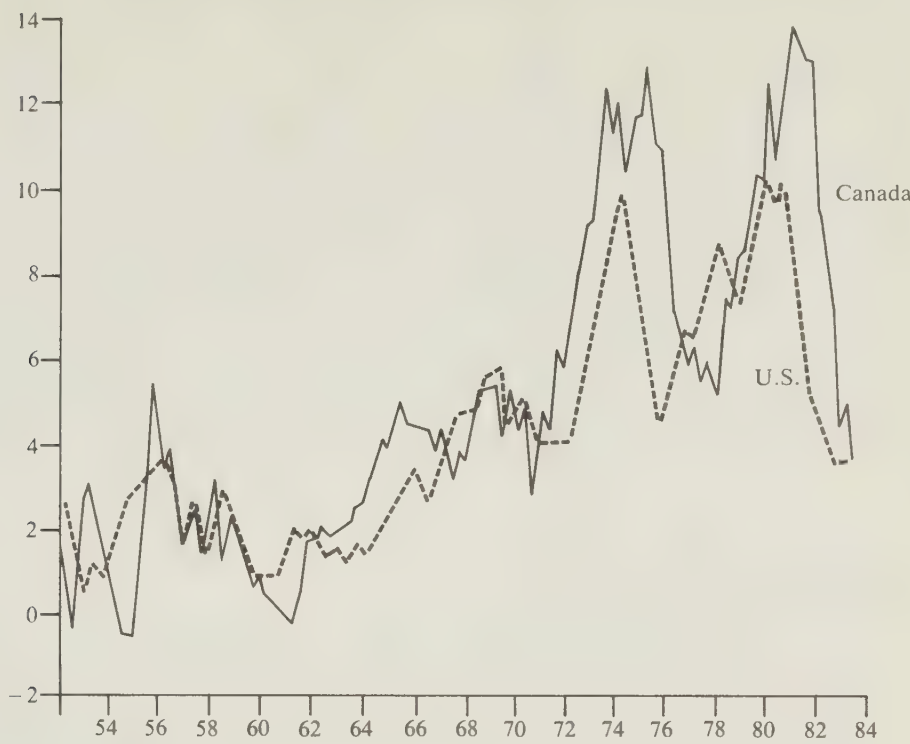
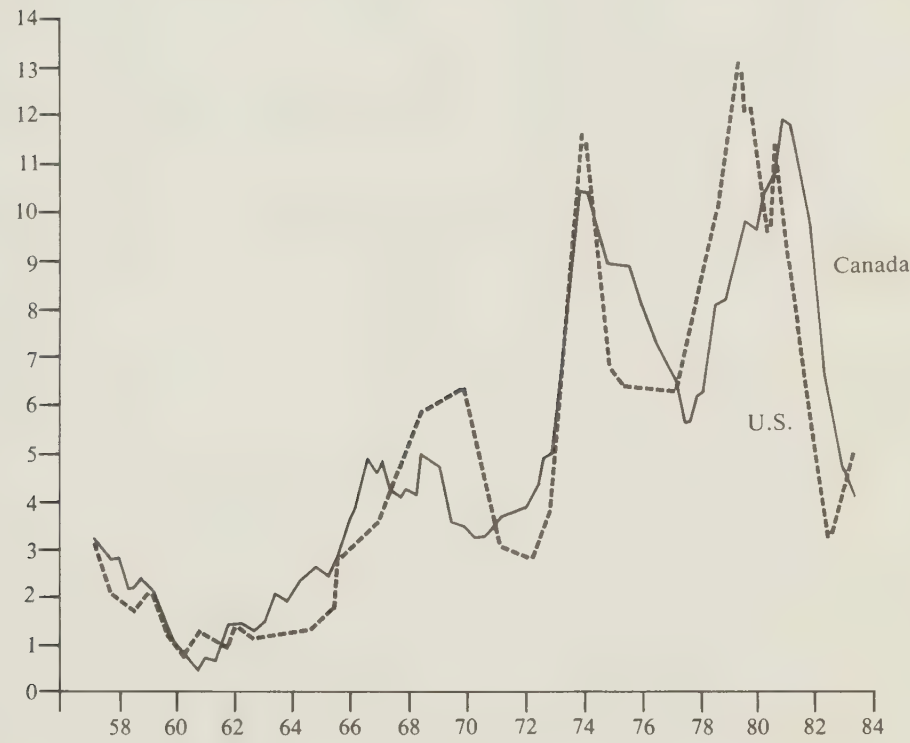


FIGURE 3-2 cont'd

The four quarter rate of change in the implicit price index for GNE excluding exports



The four quarter rate of change in the consumer price index excluding food and energy



It should again be stressed that we tried as much as possible to avoid the use of any specific models of inflation or business cycles in the papers referred to in this section, and that we conducted no formal tests of alternative theories. Thus, it would be inadvisable, at least at this stage of the analysis, to impute causality given any identified relationships between inflation and business cycles or to draw any policy conclusions. Furthermore, it is at least conceivable (if not likely) that identified changes over time in the relationship between inflation and business cycles in Canada may not have their roots in Canadian developments at all. Observed changes here could simply reflect a changing relationship of this sort in the United States and/or a changing relationship between Canadian/U.S. inflation or Canadian/U.S. business cycles. Figures 3-1 and 3-2 show the very close historical relationship between both business cycles and inflation in Canada and the United States.

AN AGGREGATE APPROACH

Ferley, O'Reilly and Dunnigan [W5] look at the relationship between a number of aggregate price series in the post-1950 period and output cycles.³ The initial measure used to gauge price behaviour during recession periods was that suggested by Cagan (1975): the annualized rate of change of prices in the preceding expansion period (with the average rate being measured trough to peak) less the annualized rate of change during the recession period. Subsequent recognition of certain deficiencies in this measure led to the use of an alternative suggested by Sachs (1980): the annualized inflation rate during the recession against that observed in the year prior to the recession. In what follows, the terms "sensitivity" and "flexibility" are used interchangeably, but it should be borne in mind that the methodologies used do not test the hypothesis that inflation rate movements are caused by business cycles. A drawback with both of the methods mentioned above is that they do not account for the severity of the business cycles. While Ferley, O'Reilly and Dunnigan note that most post-1950 Canadian slowdowns were of broadly similar magnitude, a problem nevertheless remains.

The principal results from this inquiry for the Sachs measure are shown in Table 3-1. Most of the price series considered do seem to decelerate during recessions. However, the Consumer Price Index (CPI) gives rather less evidence of such a pattern and, to the extent such a pattern does emerge, it appears to depend significantly on the food component. As to changes over time in the degree of cyclical relationship, using the Sachs measure there is no evidence of any increase over time. However, it is also the case that there is no evidence using postwar data that any of the highly aggregated price series are becoming less closely related over time to cyclical movements in economic

TABLE 3-1 Annual Rate of Change of Prices in Postwar Business Cycles

Reference Cycles			Implicit Gross National Expenditure Deflator			Consumer Price Index(UA)			Industry Selling Price Index(UA)			Wholesale Price Index(UA)		
Trough	Peak	Trough	Rec			Rec.			Rec			Rec		
			Expansion ^a	Recession	-Ex.	Expansion ^a	Recession	-Ex.	Expansion ^a	Recession	-Ex.	Expansion ^a	Recession	-Ex.
1949:Feb.	1951:May	1951:Dec.	+9.9	+7.1	-2.8	+11.3	+8.2	-3.1	n.a.	n.a.	n.a.	18.0	-3.2	-21.2
1951:Dec.	1953:May	1954:June	-0.9	+1.6	+2.5	-1.4	+1.0	+2.4	n.a.	n.a.	n.a.	-1.8	-1.1	+0.7
1954:June	1957:Jan.	1958:Jan.	+4.9	+1.0	-3.9	+3.1	+2.4	-0.7	+2.9	+0.4	-2.5	3.0	-0.7	-3.7
1958:Jan.	1960:Mar.	1961:Jan.	+1.7	+0.4	-1.3	+1.6	+1.9	+0.3	0.0	+0.1	+0.1	-0.2	+0.5	+0.7
1961:Jan.	1974:May	1975:Mar.	+13.6	+13.0	-0.6	+10.6	+10.7	+0.1	+19.0	+13.5	-5.5	+25.6	+7.3	-18.3
1961Q1	1966Q1	1968Q1	+4.4	+3.9	-0.5	+3.6	+3.7	+0.1	+3.3	+2.1	-1.2	+4.6	+1.8	-2.8
1968Q1	1969Q4	1970Q4	+4.8	+4.9	+0.1	+4.5	+2.2	-2.3	+3.9	+1.3	-2.6	+4.1	+0.0	-4.1
1970Q4	1974Q1	1975Q1	+13.6	+13.0	-0.6	+9.7	+11.6	+1.9	+17.5	+16.0	-1.5	+27.0	+10.2	-16.8
1975:Mar.	1979:Oct.	1980:June	+12.0	+11.6	-0.4	+9.5	+10.5	+1.0	+15.0	+12.0	-3.0	n.a.	n.a.	n.a.
1980:June	1981:June	1982:Dec.	+9.9	+10.4	+0.5	+12.7	+9.6	-3.1	+11.5	+4.8	-6.7	n.a.	n.a.	n.a.

Note: The basic data for the implicit GNE deflator are quarterly and seasonally adjusted (SA). The basic data for the other series are monthly and unadjusted (OA).

a. The inflation rate during the expansion was calculated as the annualized rate of change between the peak and one year before the peak.

n.a. = not available.

TABLE 3-2 Comparison Between Using the Business Cycle and the Inflation Cycle

Implicit Gross National Expenditure Deflator (PGNE)			Filtered ^a PGNE using the business cycle dates for the peak & trough			Inflation cycle (+ lag) (- lead)			Filtered ^a PGNE using the inflation cycle dates for the peak & trough		
Business Cycle			Rec			Peak			Rec		
Trough	Peak	Trough	Expansion	Recession	-Ex.	Expansion	Recession	-Ex.	Expansion	Recession	-Ex.
1949Q1	1951Q1	1951Q4	+9.9	+7.1	-2.8	+11.9	+4.5	-7.4	+14.1	-0.9	-15.0
1951Q4	1953Q2	1954Q2	-0.9	+1.6	+2.5	+1.4	+1.1	-0.3	+2.1	+0.3	-1.8
1954Q2	1956Q4	1957Q4	+4.9	+1.0	-3.9	+2.8	+2.2	-0.6	+4.9	+0.9	-4.0
1957Q4	1960Q1	1961Q1	+1.7	+0.4	-1.3	+0.8	+0.6	-0.2	—	+0.3	—
1961Q1	1974Q1	1975Q1	13.6	+13.0	-0.6	+16.9	+9.7	-7.2	+16.9	+9.7	-7.2
1975Q1	1979Q4	1980Q2	12.0	+11.6	-0.4	+11.6	+10.7	-0.9	+12.4	+9.9	-2.5
1980Q2	1981Q2	1982Q4	+9.9	+10.4	+0.5	+10.8	+6.3	-4.5	+10.8	—	—

Seasonally Adjusted Consumer Price Index (CPI)			Filtered ^a CPI using the business cycle dates for the peak & trough			Inflation cycle (+ lag) (- lead)			Filtered ^a CPI using the inflation cycle dates for the peak & trough		
Business Cycle			Rec			Peak			Rec		
Trough	Peak	Trough	Expansion	Recession	-Ex.	Expansion	Recession	-Ex.	Expansion	Recession	-Ex.
1949:Feb.	1951:May	1951:Dec.	+10.8	+7.5	-3.3	+10.0	+2.6	-7.4	+16.5	-4.2	-20.7
1951:Dec.	1953:May	1954:June	-1.4	+1.0	+2.4	+0.6	+2.1	+1.5	+3.0	-1.4	-4.4
1954:June	1957:Jan.	1958:Jan.	+3.1	+2.4	-0.7	+2.8	+4.9	+2.1	+4.7	-0.4	-5.1
1958:Jan.	1960:Mar.	1961:Jan.	+1.3	+1.5	+0.2	+0.5	+0.9	+0.4	+5.9	-1.0	-6.9
1961:Jan.	1974:May	1975:Mar.	+10.9	+10.7	-0.2	+12.2	+7.7	-4.5	+14.3	+7.2	-7.1
1975:Mar.	1979:Oct.	1980:June	+9.5	+9.9	+0.4	+11.9	+11.1	-0.8	+11.9	+9.2	-2.7
1980:June	1981:June	1982:Dec.	+12.8	+9.9	-2.9	+11.5	+3.5	-8.0	+13.1	+2.9	-10.2

a. The data is filtered by taking the annualized rate of change between the two months prior to and two months following each of the peak and trough months (quarters).
b. A peak or trough could not be identified.
n.a. = not available.

activity. This result contrasts at first glance with some of the findings provided by Ferley and Dunnigan [W6] using data drawn from the period 1914–84. He does find some evidence of declining price flexibility when comparing movements in the CPI in the prewar and postwar periods, a finding similar to that of Cagan (1975) using U.S. data, but he presents a number of good reasons why this conclusion should not be accepted without qualification. In particular, unprocessed food prices are highly collinear with cyclical variations and have a much smaller weight in the CPI in the postwar period.

Two objections to the analysis based on the Cagan and Sachs measures are addressed in the Ferley, O'Reilly and Dunnigan paper. The first criticism is that a phase shift may obscure the results since inflation cycle peaks and troughs may not coincide with those in the output business cycle. For example, if we assume for the moment that recession (expansion) affects inflation, the full effect may extend beyond the business cycle trough (peak). The second criticism is that, for the Cagan measure and to a lesser extent the Sachs measure, the length of this phase shift will change from observation to observation as annualized inflation rates are derived from periods of varying duration. Different measures of the cyclical sensitivity of inflation were calculated for the major weighted price series (and a number of other aggregations) to take into account these two objections. One measure entailed looking at the difference between the rate of inflation around the peak month or quarter and that around the trough month or quarter. As can be seen from Table 3-2 the basic conclusions noted above were not altered. An additional point of interest, however, is that the trough in the CPI inflation cycle was observed to lag the business cycle more than did inflation measured using either the industry selling-price index (ISPI) or the wholesale price index. The relationship between the CPI and the recession portion of the business cycle was also more pronounced when this lag was taken into account.

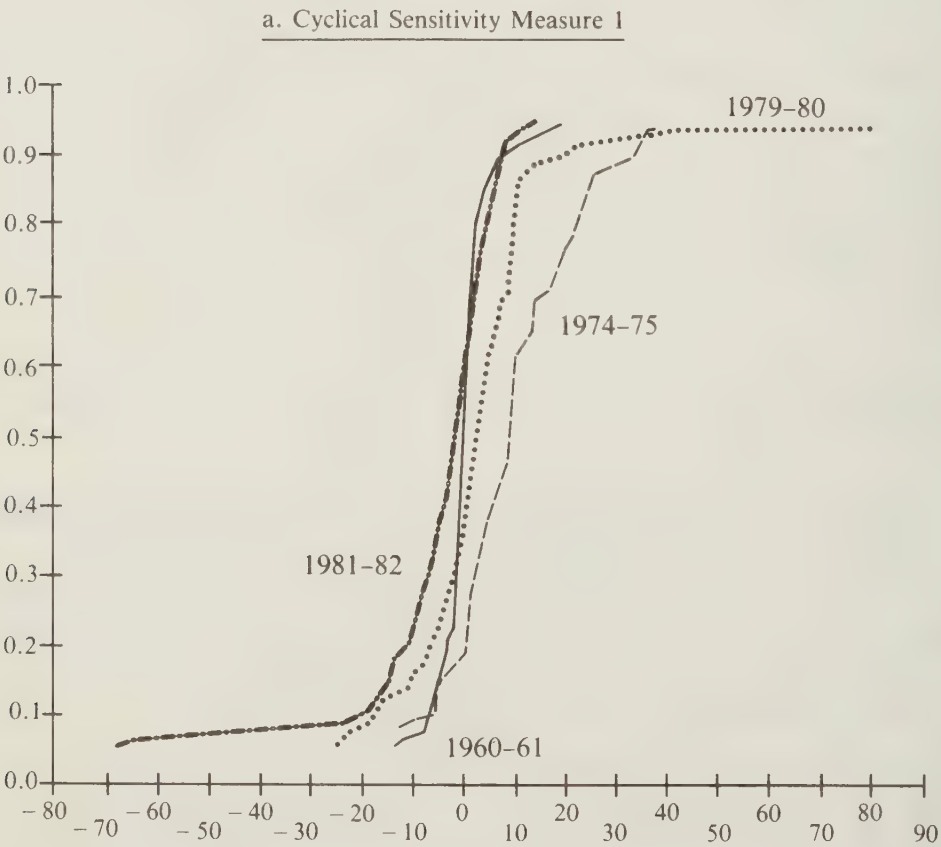
A DISAGGREGATED APPROACH USING CUMULATIVE DENSITY FUNCTIONS

The Ferley, O'Reilly and Dunnigan approach has the advantage of focussing directly on aggregate series that are considered key macroeconomic policy variables. In particular it emphasizes movements in aggregate measures of the rate of inflation, measures that more closely approximate the concept of sustained movement in an absolute price level. It is this latter definition of inflation which most economists would agree is determined in the long run by the growth rate of the money supply. The disadvantages are that available aggregate measures can obscure much interesting detail about price movements and can possibly lead to false conclusions about any changes over time in the short-run

relationship between inflation and business cycles. Errors of interpretation could arise, due either to changes in coverage or to weight shifts between components with different cyclical sensitivities.

An alternative procedure is used by Armstrong [W2] to investigate not only the issues raised by Ferley, O'Reilly and Dunnigan but other issues as well. Armstrong follows a methodology suggested by Cagan (1975). He uses unweighted, disaggregate data drawn from the monthly series used to construct the CPI (97 series going back to 1949) and the ISPI (136 series going back to 1956).⁴ For each business cycle and for each price series he then calculates both the Cagan and Sachs measures of cyclical sensitivity described above. Finally, he calculates cumulative density functions for each recession that relate sample proportions on the vertical axis to values of the price change measure on the horizontal axis. A sample of these density functions is shown in Figures 3-3 and 3-4. By way of interpretation, comparison of cumulative density functions for various recessions can provide evidence about changes in cyclical sensitivity between recessions. Decreased sensitivity is indicated by a shift of the function to the right when the functions for two recessions are plotted on a common graph. In addition, however, this methodology can tell us something about changes in relative price variability as well. Increased relative price variability would be indicated by a general

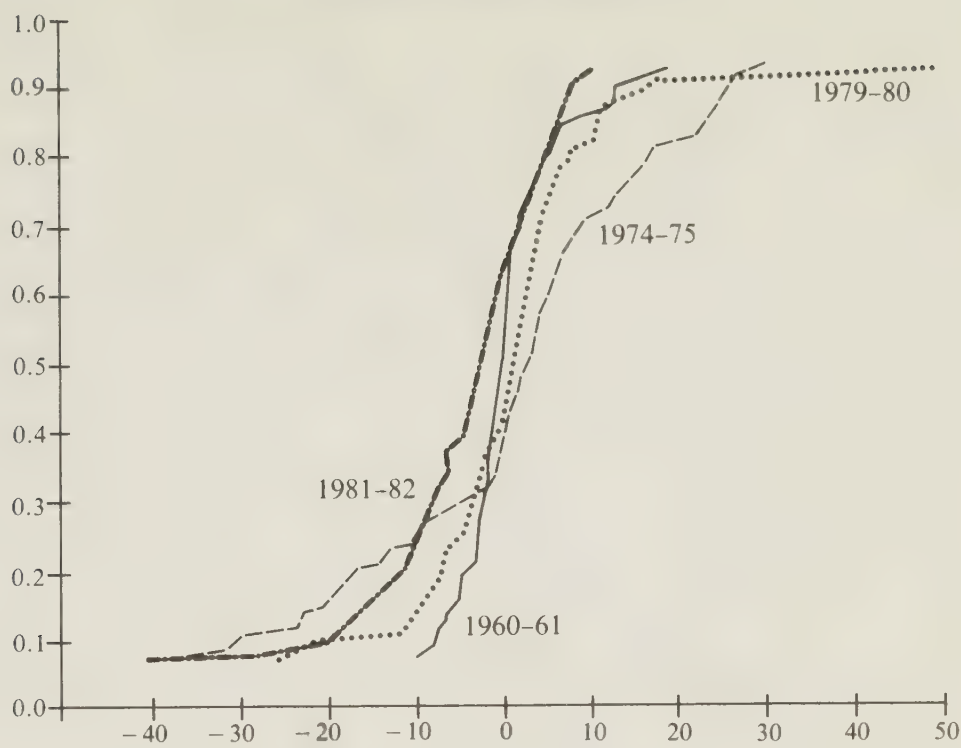
FIGURE 3-3 CPI Cumulative Density Functions of Price Changes



The Cagan Approach: the recession period inflation rate is corrected using the average inflation rate over the previous cyclical upturn.

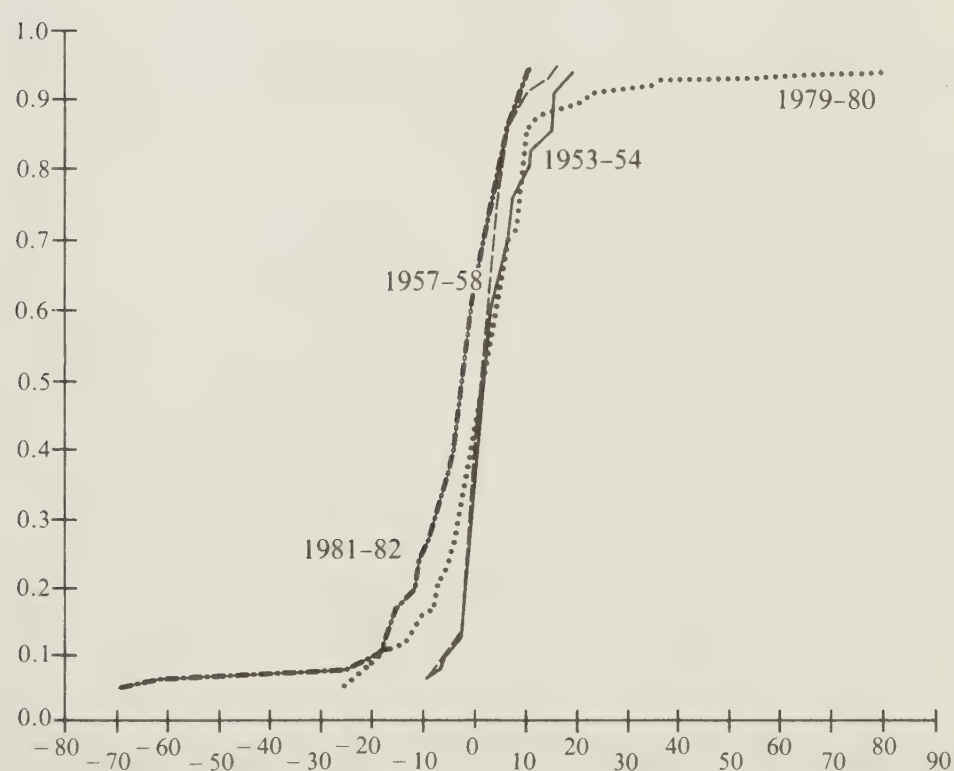
FIGURE 3-3 cont'd

b. Cyclical Sensitivity Measure 2



The Sachs Approach: the recession period inflation rate is corrected using the inflation rate in the four quarters preceding the economic downturn.

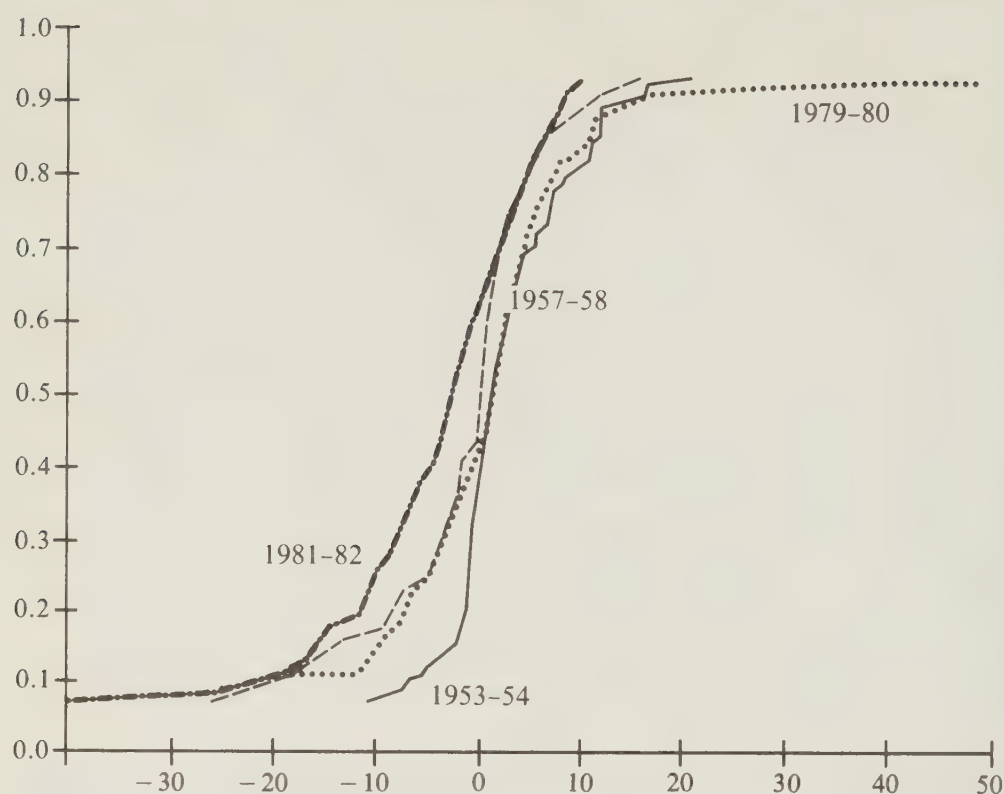
c. Cyclical Sensitivity Measure 1



The Cagan Approach —

FIGURE 3-3 cont'd

d. Cyclical Sensitivity Measure 2



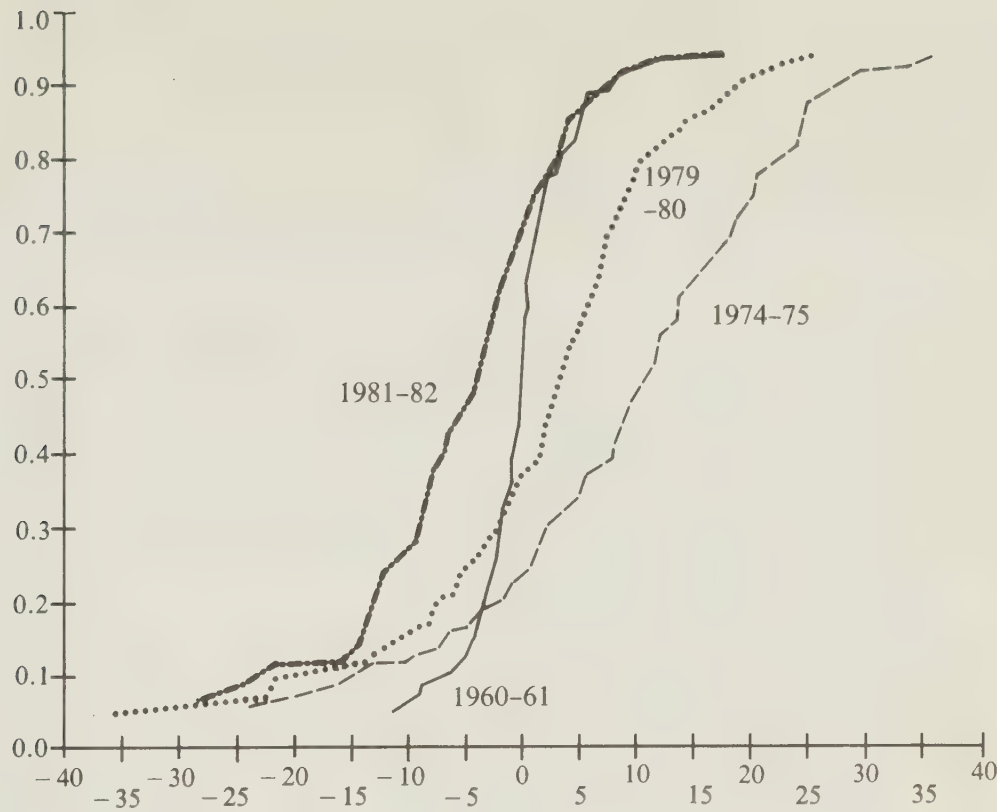
The Sachs Approach —

“flattening-out” of the density function as more recent recessions are considered. In view of the suggestion that relative price movements may play a role in the propagation of business cycles, this would seem an interesting issue.

Armstrong’s examination of the price change distributions for Canadian CPI and ISPI prices suggests two main conclusions. First, using the Sachs measure some weak evidence of increased flexibility was found for the CPI but not for the ISPI. By way of a corollary, it is important to note that there was again no evidence of decreased price flexibility over time. Second, the variances of these distributions are much larger for recessions during the 1970s and early 1980s than for recessions prior to 1970. This indicates that the variability of relative prices has indeed been increasing over time.⁵ This finding also implies that the apparent increase in the average cyclical sensitivity of prices since 1975 may be due only to a subset of prices rather than to an increased flexibility of all prices. Finally, Armstrong also calculated price change distributions for groups of ISPI and CPI prices. He could find no statistically significant evidence against the hypothesis that the above conclusions are generally valid, and do not depend on the chosen data groupings.

FIGURE 3-4 ISPI Cumulative Density Functions of Price Changes

a. Cyclical Sensitivity Measure 1



The Cagan Approach —

b. Cyclical Sensitivity Measure 2



The Sachs Approach —

Relationship between Profits, Real Wages, Income Shares, and Business Cycles

Since the evidence presented above suggests that prices do bear some relationship to business cycles, it would be interesting to know the extent to which different factor incomes are affected in the process. More specifically, what is the role played by profits? It is at least conceivable that changes in profits during cyclical fluctuations affect firm behaviour in such a way as to increase the amplitude of such fluctuations.⁶

While our primary interest is in the cyclical behaviour of profits themselves, we explore the issue by considering in addition income shares, real wages and productivity growth. Using accounting identities based on the System of National Accounts (SNA), it can be demonstrated that the share of business output absorbed by capital (profits plus interest) tends to decline if real wages per worker grow faster than the rate of growth of output per worker.⁷

Much of the work reported in the next two subsections is less model-free than that reported above. For example, adjusting rate-of-return data for inflation implicitly uses a model to determine adjustments that are economically relevant. Likewise, the regression analysis used to examine some of the data depends on a theoretical view of appropriate specification. Nevertheless, as in the rest of this section, no attempt has been made to articulate or test particular economic models, and any conclusions drawn ought to take this into account.

PROFITS AND BUSINESS CYCLES

Stuber [W17] considers the evolution of aggregate profit margins measured as SNA pre-tax corporate profits as a fraction of current dollar GDP. While his emphasis is on cyclical fluctuations, he also notes (see Figure 3-5) that there seems to be no secular trend in profit margins over the postwar period.⁸ This having been said, he records the well-known fact that conventional measures of profits may have become less reliable over the last number of years because these years have been influenced by higher inflation.⁹ Stuber calculates pre-tax rates of return for non-financial corporations and the manufacturing sector over the period 1966–80 using both naive and inflation-adjusted estimates. Although the naive rates of return tended to rise over the period, the adjusted rates were either flat or declining (Figures 3-6 and 3-7). This may indicate that a secular problem of declining “real” profitability does exist in some areas at least.

As to the cyclical variability of profit margins, Stuber’s SNA data confirm that profits are on aggregate pro-cyclical (see Table 3-3) and that the profits of the manufacturing and wholesale trade sectors are particularly so. At a still more disaggregated level (using industrial corporation financial data),

FIGURE 3-5 Corporate Profits/GDP at Factor Costs

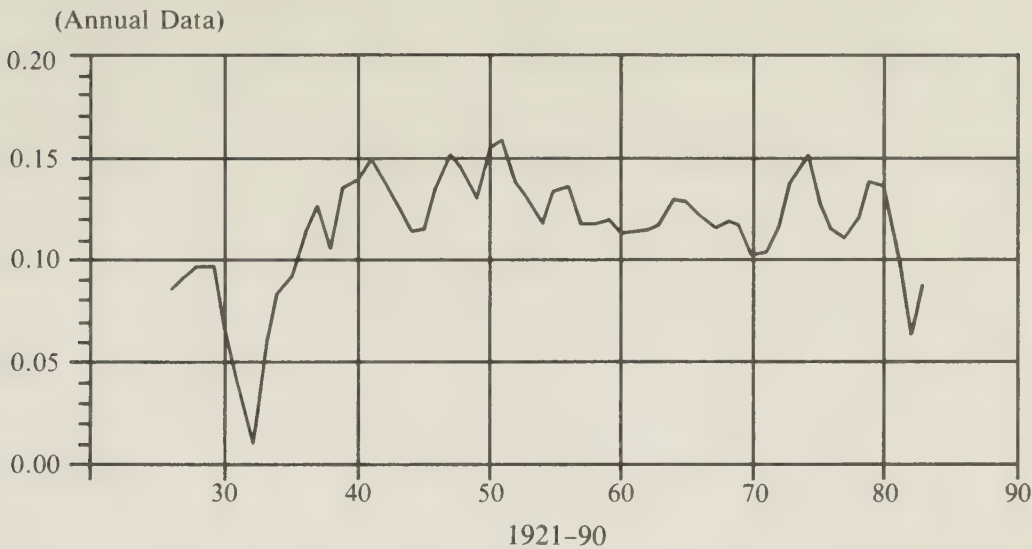


FIGURE 3-6 Pre-Tax Rates of Return: Non-Financial

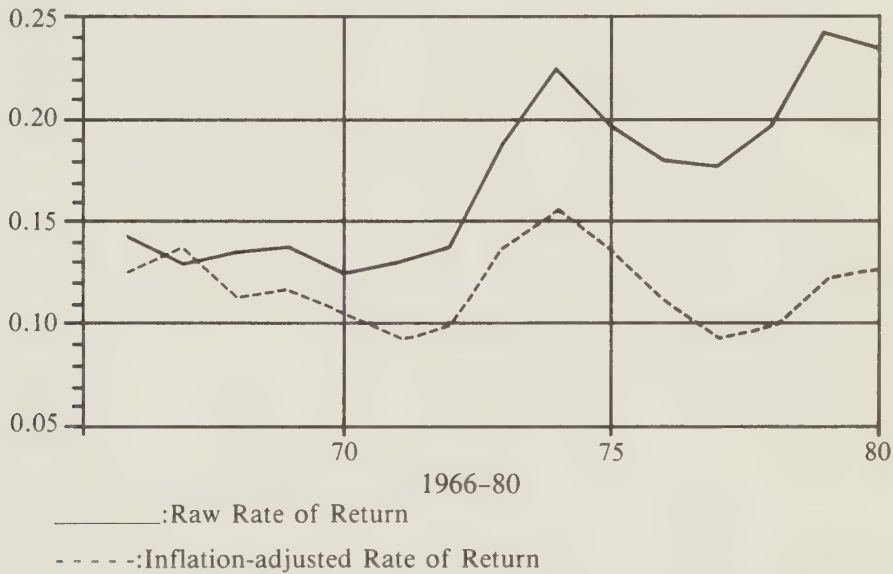


FIGURE 3-7 Pre-Tax Rates of Return: Manufacturing

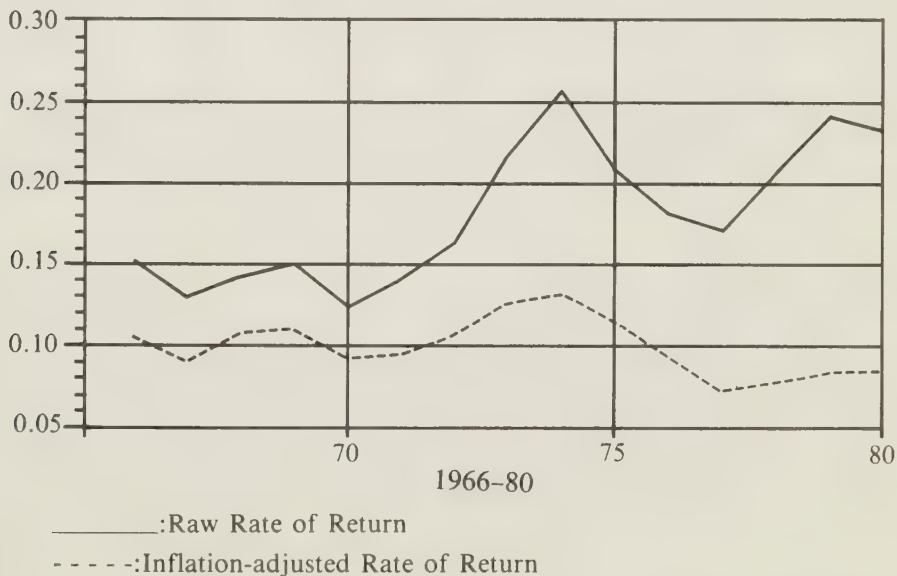


TABLE 3-3 Cyclical Behaviour of Profit Margins (Ratio of Corporate Profits Before Taxes to Current Dollar Gross Domestic Product) Using Annual Data

Business Cycle Period	Real Gross National Expenditure		Percentage Change in Real GNE Peak to Trough	Aggregate		Mining ^a		Manufacturing	
	Peak	Trough		(1)	(2)	(1)	(2)	(1)	(2)
? -1933	1929	1933	-30.1	n.a.	-90.5	n.a.	-43.2	n.a.	^c
1933-1938	1937	1938	0.8	1271	-17.4	137	-8.0	^c	-19.3
1938-1946	1944	1946	-4.9	43.4	-9.1	7.8	-27.3	35.8	-24.3
1946-1954	1953	1954	-1.2	39.1	-8.5	28.7	-35.1	46.6	-28.2
1954-1957	1956	1957	2.4	15.8	-13.9	21.9	-31.0	16.5	-18.0
1957-1961	1960	1961	2.8	2.5	-6.3	^b	^b	6.4	-7.6
1961-1975	1974	1975	1.2	34.0	-27.3	149.1	-16.1	41.9	-33.5
1975-1982	1979	1982	-0.2	26.0	-54.0	27.0	-44.1	39.1	-70.2

profit margins have tended to be more cyclically sensitive in industries selling into the consumer durable, housing, and capital goods markets, presumably reflecting relatively stronger demand cycles. Profit margins have also been more cyclically sensitive in industries selling into international markets or exposed to international competition.

The magnitude of cyclical fluctuations in aggregate profit margins has increased since the late 1960s. Stuber also estimated aggregate profit margin equations (1947–81) with a time trend and capacity utilization in the commercial sector as explanatory variables. A Chow test shows a significant break in 1969Q4. Moreover, the regression results provide limited evidence that the responsiveness of aggregate profit margins to changes in capacity utilization rates also increased in the 1970s and early 1980s. As with the evidence on secular trends, an important qualification to these conclusions is the possible bias imparted to profit figures by our recent inflationary experience. To examine this, Stuber considered the cyclical behaviour of unadjusted and inflation-adjusted rates of return over the period 1966–80. The amplitude of rate of return cycles was much smaller using inflation-adjusted figures and there was no clear evidence that the amplitude of these cyclical fluctuations has been increasing.

Stuber [W19] also investigated whether the degree of industrial concentration has any impact on the responsiveness of profit margins to cyclical expansions and contractions. Following Pulling (1978), Stuber estimated cross-section regressions explaining the cyclical amplitudes of profit margin movements for the 15 manufacturing sectors at the two-digit 1970 Standard Industrial Classification (SIC) level. He uses the four-firm concentration ratio as the explanatory variable. A separate regression is estimated for each of four expansions and four contractions and he concludes that there is some, though not statistically significant, evidence that sectors with higher concentration ratios have less volatile profit margins in both cyclical upswings and downswings, and that there is no evidence of any change in these relationships over time. The weak evidence for reduced volatility of profit margins in more highly concentrated industries, cited above, was not supported when more disaggregated data were used.

INCOME SHARES, REAL WAGES AND PRODUCTIVITY, AND BUSINESS CYCLES

In three related papers, Jarrett [W9], Jarrett [W10] and Stuber [W17] look at various aspects of these relationships with special reference to business cycle movements. Jarrett [W9] looks directly at income shares over the period 1952–83. As to secular movements, the share of total capital (as defined in row 16 of Table 3-4) has been increasing over time and that of total labour (row 15 of Table 3-4) has been decreasing, though remaining relatively flat since the 1960s.¹⁰ Both of these trends require qualifica-

TABLE 3-4 Income Shares

	Trend Coefficients ^a	Coefficients of Variation (Percentage) ^b		Annualized Rate of Change of Shares (Percentage)		
		Total Sample	Expansions	Contractions	Expansions	Contractions
1. Labour income	0.0015	5.69	5.82	5.30	-0.39	3.27
2. Private sector ex. supplementary ^c	-0.0006	2.03	2.01	2.02	-0.78	0.52
3. All others ex. supplementary ^c	0.0056	15.00	15.20	14.61	0.08	7.47
4. Supplementary inc. adjustment term ^c	0.0120	31.88	32.98	29.34	4.08	3.65
5. Military pay	-0.0089	31.85	31.65	32.82	-3.92	2.74
6. Pre-tax corporate profits	-0.0013	14.29	10.75	20.17	5.75	-15.29
7. Pre-tax corporate profits after IVA	-0.0032	15.42	12.53	20.54	3.36	-10.71
8. Dividends abroad	-0.0036	18.77	19.10	18.18	-2.21	1.73
9. Interest and investment income	0.0103	41.70	39.66	46.32	5.12	2.36
10. Accrued farm income	-0.0109	53.78	55.26	45.77	2.60	-23.19
11. Nonfarm unincorporated business income	-0.0088	30.91	31.03	30.99	-4.09	1.88
12. Indirect taxes less subsidies	-0.0006	8.03	8.09	7.87	-0.07	-0.02
13. Capital consumption allowances (CCA)	0.0002*	5.74	5.85	5.25	-0.16	3.13
14. Residual error ^d	0.0000	551.44	507.14	705.83	n.a.	n.a.
15. Total labour income (1 + 5 + 10 + 11)	-0.0002	1.63	1.57	1.50	-0.94	1.23
16. Total "capital" income (7 - 8 + 9 + 13)	0.0009	5.69	5.42	6.20	1.93	-2.84
17. Other (12 - 14)	-0.0008	9.41	9.03	9.99	0.80	-0.47

a. From semi-log regression of income shares against time (1952Q1 to 1983Q3). Coefficient approximates one hundredth of the mean percentage growth rate over the period. All coefficients are significantly different from zero at 5 percent unless indicated by an asterisk (*).

b. Standard deviation/mean.

c. Data for these series were available only from 1961Q1 forward.

d. These regressions were run linearly because of the presence of negative observations.
n.a. = not available.

tion. The rise in capital's share masks a decline in the pre-tax corporate profit share, after inventory valuation adjustment (IVA), amounting to about 1.3 percent per annum and a very substantial increase in the share of interest and investment income. In short, if capital's share of factor incomes has tended to increase, there has been a still more marked shift of incomes away from equity holders, especially those from abroad, to debt holders. In part, this shift between elements of the capital component reflects the upward trend of nominal interest rates and inflation-induced distortions due to conventional accounting practices. In part it also reflects a trend toward higher debt financing. A further point is that some part of the positive trend for the share of total "capital" income is due to household and government receipts of royalties. The latter are, of course, a return to land rather than to capital as such. The secular decline in the share of total labour income reflects downward trends in a number of major components: private sector labour income (excluding supplementary labour income), accrued farm income and non-farm unincorporated business income. These last two decreases have been particularly marked, reflecting the declining relative importance of farming in the economy and a trend to the incorporation of small businesses. Partially offsetting these declines were increases in supplementary labour income and labour income derived from public sector employment.

Jarrett [W9] goes on to look at the variability of income shares with particular emphasis on the relationship with business cycles. He cautions (see Table 3-4) that, while total capital's share appears to have been much more volatile than total labour's share, this largely reflects the relative size of their shares and the fact that together they virtually exhaust total output.¹¹ He comments upon the remarkable stability in the share of factor income going to labour in the private sector — a coefficient of variation of only 2 percent. A more detailed consideration of the rates of change of income shares in individual recessions and expansions (as defined above in the subsection on the relationship between prices and business cycles) indicates that labour's share (narrowly defined) tends to decline slightly in expansions but to increase markedly in contractions. This principally reflects the pro-cyclical nature of labour productivity (coupled with the lack of cyclical variability in real wages) and helps to explain the pro-cyclical nature of profit movements. As to changes over time in the cyclical variability of income, Jarrett notes only that the most recent cycle was atypical; the share of corporate profits declined at almost twice the average rate of earlier recessions, while the recovery in profits (after IVA) was almost five times as fast as the average. The latter development reflects mainly the unusually large swing in interest rates and the atypical behaviour of productivity in the most recent cycle.

As noted above, changes in the shares of factor income going to labour

and capital can be explained in an accounting sense by differences between the growth rates of real wages per worker on the one hand and productivity on the other. Jarrett [W10] looks at the first issue, and Stuber [W20], the second. Jarrett notes in his paper that “there is no single, optimal measure of the *real wage*” and thus constructs 11 different measures of this variable using different combinations of various nominal wage measures and deflators. An important distinction is between measures deflated by consumption prices (seen as relevant to labour suppliers) and those deflated by production prices (seen as relevant to labour demanders). All the series show the same secular pattern: fairly steady growth in real wages until the mid-1970s and much slower, even negative, growth thereafter. However, the secular rate of growth of economy-wide real wages (calculated from an income measure that includes the private and public sector and wage and other compensation) appears to be greater than other measures that incorporate only wage compensation in the private sector. This reflects in part the relatively rapid secular growth of supplementary labour income (employers’ contributions to unemployment insurance, pensions, medicare, etc.) as well as the more rapid growth in total compensation in the public sector. After a survey of the literature, Jarrett goes on to look at the cyclical behaviour of real wages. Simple visual inspection of the various series leads to no clear conclusions. Some real wage measures are pro-cyclical while others are not. This lack of consistency is probably because of other variables (e.g., productivity, factor proportions, taxes, etc.), whose influence could be accounted for only through use of a structural model.

There is no such ambiguity with respect to productivity growth. Virtually all measures of aggregate productivity growth in Canada show a marked deterioration after 1974,¹² and the break is common to a large number of industrial sectors. Moreover, in Stuber [W20] clear evidence is presented that labour productivity growth is pro-cyclical (see Tables 3-5 and 3-6). This conclusion is supported using four different measures of aggregate output as well as more disaggregated data drawn from a number of industrial sectors. Some evidence also emerges to support the existence in Canada of what Gordon (1979) calls the “end-of-expansion” phenomenon: productivity growth tends to end before the cyclical peak. The pro-cyclical nature of labour productivity growth may in part reflect costs of hiring and firing employees. Finally, it is of interest to note that productivity’s rate of decline in the 1981–82 recession was less than in the 1974–75 and 1979–80 recessions, even though the output decline was much larger in the latest recession. Since an “average” degree of productivity growth (after controlling for output growth) for an upswing has been experienced over 1983, the level of productivity in early 1984 was higher than might normally have been expected given the concurrent level of output.

TABLE 3-5 Average Annual Changes in Aggregate Labour Productivity and Output from Peak to Trough

	1953Q2- 1954Q2	1956Q4- 1957Q4	1960Q1- 1961Q1	1966Q1- 1968Q1	1969Q4- 1970Q4	1974Q1- 1975Q1	1979Q4- 1980Q2	1981Q2- 1982Q4
	(percent)							
Real gross national expenditure per employee	-2.1	-1.6	-1.6	1.3	-0.7	-1.9	-1.7	-1.2
Real GNE	-2.6	-0.3	-1.1	3.5	0.9	-0.4	-0.6	-4.6
Real gross domestic product per employee	-2.9	-3.7	-1.3	1.5	0.2	-2.1	-2.1	-1.3
Real GDP	-3.6	-2.4	-0.9	3.7	1.8	-0.6	-1.0	-4.7
Commercial (excluding agriculture, fishing and trapping)								
Output per employee	n.a.	n.a.	n.a.	2.0	2.7	-3.0	-1.9	-0.1
Output	n.a.	n.a.	n.a.	3.7	1.5	-1.7	-2.3	-6.4
Goods-producing (excluding agriculture), transportation, storage, communications and trade								
Output per employee	-1.7	-4.0	0.5	2.2	0.6	-3.4	-2.8	-2.8
Output	-3.6	-3.4	-0.9	3.3	1.1	-4.1	-4.3	-9.3

Source: Statistics Canada data.

n.a. = not available.

TABLE 3-6 Average Annual Changes in Aggregate Labour Productivity and Output from Trough to Peak

	1954Q2- 1956Q4	1957Q4- 1960Q1	1961Q1- 1966Q1	1968Q1- 1969Q4	1970Q4- 1974Q1	1975Q1- 1979Q4	1980Q2- 1981Q2	1982Q4- 1984Q2
	(percent)							
Real GNE per employee	5.1	2.6	3.3	3.2	3.4	0.9	1.3	2.8
Real GNE	8.4	5.4	6.8	5.9	7.2	3.7	5.0	5.5
Real GDP per employee	5.6	2.8	3.4	3.1	3.3	1.0	1.3	2.3
Real GDP	8.9	4.5	6.8	5.8	6.9	3.8	4.9	5.0
Commercial (excluding agriculture, fishing and trapping)								
Output per employee	n.a.	n.a.	n.a.	2.8	2.8	2.1	0.8	n.a.
Output	n.a.	n.a.	n.a.	6.2	8.0	4.3	5.7	6.1
Goods-producing (excluding agriculture), transportation, storage, communications and trade								
Output per employee	5.9	4.3	4.1	3.9	4.1	1.6	3.1	4.2
Output	10.4	4.7	7.7	6.1	8.2	4.1	5.6	7.0

Source: Statistics Canada data.
n.a. = not available.

PRICE VARIATION AND CHANGES IN FACTOR PRICES

The accounting relationship between factor incomes and gross national expenditures (GNE) can be used to throw light on price movements during the business cycle. Dividing both sides of the nominal identity by real GNE yields the GNE deflator as the sum of “prices” of factor incomes. By first differencing (as in Karolyi [W11], or by taking percentage differences (as in Jarrett [W9]), total output price variability can be broken into its components. Both Jarrett and Karolyi use this model-free approach to examine the contribution of these components to total price variability over the period 1950–84, and over expansions and contractions separately.

Both find that labour income’s “price” accounts for more of the variability of the GNE deflator than its share in GNE would warrant. Profit’s price, on the other hand, accounts for surprisingly little. Karolyi finds it “accounts for only about one percent of the variation of the total price index.” Upon closer examination, there are two reasons for this. First, the change in the GNE price deflator and the change in labour’s price have a positive secular component, while the change in profit’s price does not. Second, but not independent of the latter observation, during expansions profit’s price is positively correlated with the GNE deflator, while during recessions the correlation is negative. Overall, then, the correlation tends to be small. Profit is the only component of the GNE deflator with this pattern.

Price Determination and Business Cycles

What factors determine the level of prices and inflation in the Canadian economy? While at any moment in time certain prices may be said to be set by the decisions of particular economic agents, feedback effects from such decisions imply that over time prices reflect the interaction of all elements of the economic system. In effect, a theory of price determination must also be a more general theory of how both prices and quantities are determined. This is now generally accepted. Most economists also agree that in the long run the level and rate of growth of the aggregate price level will be primarily determined by the money stock or some other nominal asset. This implies that at the end of a suitably long period the rate of monetary expansion and inflation will have no effect on real variables.¹³ These will tend to equilibrium values (including full employment) which will be determined solely by real or relative price considerations.

An issue which remains contentious is how long the process of adjustment to a new equilibrium might take if the economy were to be subjected to a nominal shock. Some economists contend this adjustment will occur rapidly (the short run is short, say two years), while others feel the adjustment will occur only slowly (the short run is long, say ten

years). Opinions also vary as to why time may be required before a new full-employment equilibrium is reestablished. A second and equally contentious issue is what can be done, if anything, to improve the adjustment path through the use of macroeconomic policies. One traditional school of thought argues that government policy is both possible and potentially desirable. A more recent school of thought argues that countercyclical monetary policy is likely to be quite ineffective. These different conclusions are based in large part on different assumptions about the relative importance of institutional rigidities and expectational rigidities in explaining the behaviour of the economy.

In this part of our survey paper we begin by considering two papers by O'Reilly, (1985) and [W12]. He provides an historical survey of the literature on price determination culminating in a capsule description of a number of current schools of thought about both prices and business cycles. In the second paper he considers some direct empirical tests of alternative theories. We then go on to consider some empirical work based on Canadian data prepared at the Bank of Canada for the Royal Commission.

A Review of the Literature

POSTWAR THOUGHT ON PRICE DETERMINATION AND BUSINESS CYCLES

The experience of the 1920s and 1930s stimulated a great deal of research into the theory of short-run price determination. Some such theory seemed clearly required to complement the longer-run classical quantity theory of money. As fears of depression receded, this work became more oriented to determining the speed and the stability of the inflationary process. Yet the underlying question remained essentially the same. How are prices determined in periods shorter than “the long run”?

O'Reilly (1985) reviews the postwar literature. He contends that, especially in the United States and United Kingdom, this literature had a structuralist orientation in the 1950s with particular emphasis being put on such institutional rigidities as unions and the form of the bargaining process. Keynesians also stressed income and expenditure flows rather than the money stock, with the price level generally considered to be a function of the gap between aggregate expenditures (demand) and aggregate capacity (supply) at full employment. There was as well a vigorous debate as to whether inflation was demand-pull or cost-push, though both schools of thought clearly believed in the existence of market rigidities. The discovery in the late 1950s by A.W. Phillips of an apparently stable inverse relationship between the rate of growth of wages and unemployment in Britain was a further development which was subsequently incorporated into “Keynesian” models of the *IS-LM* type. With the further assumption that prices

were “marked up” over the wage rate in a stable proportion, these models had the particularly interesting property that they seemed to offer policy makers a permanent trade-off between inflation and unemployment. A curious aspect of the literature of this period is that the focus on shorter-run adjustment problems led many (perhaps most) researchers to ignore the longer-run constraints imposed by the quantity theory and in effect to assume persistent money illusion. Cost-push models of inflation, for example, simply assumed without discussion that monetary policy would accommodate such pressures.¹⁴

A milestone on the road back to consideration of longer-run issues was Milton Friedman’s reformulation in 1956 of the quantity theory as a theory of the demand for money. Friedman’s rediscovery of the expected price change as a determinant of the velocity of circulation was also important. It reminded researchers of the crucial role played by expectations in determining the response of both prices and output to shocks of various sorts. In the late 1960s and 1970s a great deal more attention was focussed on such questions, in particular the different effects of anticipated and unanticipated inflation. A by-product of this debate was the growing acceptance of the view that there might be, after all, no long-run trade-off between inflation and unemployment. This was also the conclusion which followed from the classical theory of the prewar period according to which output levels were wholly determined by real (relative price) considerations while the general price level was independently set according to the quantity theory of money.

To summarize the price/wage literature of the last 20 years or so, there has been a clear trend back toward considering the inflation-unemployment nexus in the context of an overall economic model. The role and implications of expectations formation has also been increasingly emphasized. Indeed, the process of endogenization has proceeded to a point where substantial attention is now being paid in the literature to the factors (both political and economic) likely to condition over time the behaviour of the monetary authority.

Yet it should not be inferred that the existence, causes and consequences of price rigidities have ceased to be of interest and controversy. At the micro level a number of theoretical papers in the early 1970s examined factors that might lead firms to set prices differently in the short than the long run. Questions of market structure, costs of price adjustment, and uncertainty about the form of demand and supply functions (or competitors’ responses) all received attention. More recently, research has again been focussed on this area with special attention being paid to optimal contracting theory (which may constrain firms’ behaviour in the short run) and the integration of price/output and inventory decisions. While progress is being made here, there is still a substantial amount of work to be done to describe the link between micro theory and macro models. The former are fundamentally con-

TABLE 3-7 Schools of Thought on Price Determination and Business Cycles

	Adaptative Expectations	Rational Expectations
More Price Rigidities	Neo-Keynesian	New Keynesian
Fewer Price Rigidities	Monetarist	New Classical

cerned with relative prices, and the latter with the inertia of the general price level. Blanchard (1983) and others have noted that individual firms make decisions about short-run prices at different times and have recently made attempts to use this assumed asynchronization of price decisions to forge a micro-macro link. A deficiency of this approach is that asynchronization is simply assumed rather than arising from any theory of optimizing behaviour.

CURRENT SCHOOLS OF THOUGHT

Currently held theories of short-run price determination and business cycles have their roots in the literature just described. O'Reilly in (1985) and [W12] attempts to classify these theories on the basis of assumptions made about two central elements in the literature — institutional rigidities and expectations — and the essence of his distinctions is recorded in Table 3-7.

The cross-classifications in the table are highly simplified to help focus the attention of a wide audience on the major ways of viewing the propagation of a business cycle. By way of explanation, those espousing adaptive expectations believe that economic agents use the historical performance of the relevant series as an indicator of the likely future evolution of the series. Those espousing rational expectations believe that economic agents make predictions using the particular economic model appropriate to the variable(s) under consideration. A standard example of a price rigidity is a contract that remains in existence in the face of a shock. While the focus of attention below is on how different schools describe the behaviour of an economy faced with nominal shocks, it needs to be noted that business cycles can also have real origins and that this fact has possible implications for the subsequent adjustment path. O'Reilly [W12] then goes on to report on empirical tests to discriminate between alternative paradigms. We begin by simply describing his work but finish with some qualifications and indications of an emerging convergence of view.

The Neo-Keynesian school leans heavily upon adjustment costs and the heterogeneity of markets, factors and products in the real world to explain inertia in the response of prices and wages to nominal shocks.

The transmission mechanism is complex, running through aggregate demand directly to wage (and sometimes to price) inflation and only then on to prices via markup behaviour subject to inertias of various sorts. Expectations may be treated as important but are considered to be formed adaptively. The upshot is that prices move slowly for a number of reasons, deviations from full employment may go on for a long time, and both series display an inherently cyclical behaviour. In the Neo-Keynesian world discretionary monetary policies have output effects that can persist for an extended period and plant the seeds for an eventual reversal.

On the face of it, there seems to be substantial empirical support in the literature for this school of thought. (Empirical evidence directly pertinent to Canada is considered below.) For example, most large macro-models have structures consistent with the existence of such rigidities. Robert Gordon's work provides another and different example of such support. In a number of papers Gordon has advocated the use of a single-equation reduced form to examine the historical stability of the price/quantity adjustment to a nominal income shock in the short run. From his early work he concluded that there were important elements of inertia in the wage-price process. Gordon (1980) claimed that his evidence showed that in the first year annual GNP changes (nominal) in the United States have been consistently divided with two-thirds in the form of output change and one-third in the form of price change. In a later paper, Gordon (1982) confirmed his basic Neo-Keynesian status. He noted that earlier work based on the Phillips curve view of the world was "less wrong than incomplete." If variables representing the impact of external supply shocks (food, energy), the impact of government (wages/price controls), and the influence of the exchange rate are taken into account, then a Phillips curve type model provides an adequate explanation for movements of inflation in the United States in the period 1954–80. Coe and Holtham (1983) applied Gordon's methodology to the investigation of the price/real output split in the major OECD countries. They concluded that variations in the level of nominal expenditures are likely to have real effects that continue for some years. For example, they found that for Canada inflation absorbed about 75 percent of the fluctuation in nominal income growth within one year as opposed to a much slower 20 percent in the United States. This latter figure is itself somewhat lower than the one-third estimate provided for the United States by Gordon.

A number of authors have addressed the question of changes over time in the relationship between inflation, nominal income and business cycles. The results have been rather mixed. Gordon (1980) noted that his results were "extremely stable" over the period 1892–1978, though there did seem to be a shift after the Korean War in the formation of expectations regarding the price level and its rate of change. As to the postwar

era, Gordon concluded in his 1982 paper that his basic equation was essentially stable over the 1954–80 period. Conversely, Coe and Holtham found that regressions based on data from other countries were often unstable. These findings based on regression analysis generally conflict with the results found using the “model-free” methodologies of Sachs (1980) and Cagan (1975) on U.S. data. The latter author in particular contends that there has been a gradual decline over the postwar period in the extent to which U.S. inflation and business cycle movements seem to be related.

The monetarist school of thought would seem to anticipate a generally faster response of inflation to nominal shocks (and therefore smaller output effects) than would the Neo-Keynesians. Less emphasis is put on structural rigidities, though many models of this sort do still tend to assume the adaptive formation of expectations.¹⁵ There is also generally less eclecticism as to the source of nominal shocks. These are primarily assumed to arise from policy decisions taken either by the domestic monetary authorities in a closed economy or by changes in the world money supply if the economy is open and the exchange rate fixed.

There are various models extant of the type deemed monetarist and they have a reasonable track record. A major difficulty from the perspective of this study is that theoretically there are few features that distinguish monetarist from Neo-Keynesian models. The differences are ones of emphasis rather than structure. Monetarists tend to emphasize a direct linkage between money and prices. Even though they recognize that one implication of lags between money and prices is that real incomes will be affected during the period of adjustment, they generally downplay the practical importance of this. In our judgment, fine empirical distinctions between adaptive expectations and (say) stock-adjustment hypotheses are currently beyond our powers to test econometrically.

The New Classical school of thought raises a powerful counter-argument to Neo-Keynesians who recommend institutional reforms to reduce price rigidities arising from institutional or structural sources. The significance of the New Classical view is that it provides a completely different explanation for the phenomenon of a business cycle. The emphasis of this school (Lucas, Sargent and others) is on the supply side mechanism of aggregate output and employment response rather than the excess demand mechanism stressed in the Neo-Keynesian literature. Unemployment and layoffs are deliberately, if mistakenly, chosen “unpaid holidays.” More particularly, price rigidities are assumed away, and markets clear virtually instantaneously with market participants responding to both actual and expected prices. Price expectations are formed rationally in that suppliers of goods and labour services know the model that describes the economy and utilize all the information available to them. Nominal shocks can then affect real variables, but only to the extent that they are unexpected. In this case,

the immediate aggregate price effect of the nominal shock is interpreted by market participants as a relative price shock. It is this misinterpretation which temporarily induces a change in output levels by producers or suppliers of factors of production. Thus, we can observe a short-run Phillips curve without recourse to institutional rigidities. The most celebrated result of this school is that systematic and thus predictable monetary (or fiscal) policy will be unable to affect real output.

Variants of the New Classical hypothesis have been subjected to extensive empirical testing. The general conclusion reached in separate survey articles by Laxton (1983a) and Taylor (1983) is that there seems to be relatively little support for these information-based models of business cycles in their extreme forms. An important exception has to do with tests of one implication of the Lucas version of the New Classical model, namely, that the slope of the Phillips curve should be positively related to the variability of the overall price level.¹⁶ Lucas (1973) provides evidence to support this hypothesis as do Koskela and Viren (1980). Sargent (1976) also provides some evidence that unexpected price increases reduce unemployment, while others have provided similar evidence relating movements in unemployment to unanticipated movements in the money supply. Virtually all these results have subsequently been challenged on methodological or empirical grounds. Finally, it is worth noting that deviations in output from full capacity do tend in reality to demonstrate high levels of serial correlation; that is, periods (quarters) of low economic activity are not random but follow each other in time. New Classical models explain this through recourse to information lags, to intertemporal relationships generated by the existence of inventories, capital stock, etc., and to consumption-smoothing behaviour.

The New Keynesian school borrows the rational expectations popularized by the New-classicists, and the rigidities (typically, labour contracts) assumed by the Neo-Keynesians. By making the rigidities explicit there is the hope of reintroducing a role for activist monetary policy. In the archetypal New Keynesian model — for an example see Taylor (1980), workers and firms sign multi-period contracts based on expectations about future shocks. Since these expectations, though rational, are inevitably in error, real output is affected even by nominal variables. The monetary authority (which is not bound by such contracts) can improve macroeconomic performance by offsetting the real effects of the errors. This links monetary policy directly to the explicit rigidities.¹⁷

New Keynesian models typically assume the existence of contracts rather than deriving them from optimization theory. This may seem innocuous enough since such contracts do, in fact, exist. However, microeconomic contracting theory suggests they play the role of insurance-type contracts, as well as simply mediating the exchange of labour

services. For example, workers accept cyclical unemployment in exchange for wage stability. If the form of the contracts is endogenous, then tuning monetary policy in the way suggested by the New Keynesians could have surprising results. The ability of the monetary authority to affect real activity in these models stems from the speed with which they process new information after the settlement date of the contract, and on the speed of the policy reaction process. However, agents, perceiving that governments are using such information (i.e., after the contract has been settled), may modify their contracts. Monetary policy premised on an average two-year contract might lead to unintended results if agents responded by reducing the effective average contract length.

When two alternative hypotheses are tested individually, problems emerge if the data seem to support them both. Comparative tests in which alternative hypotheses are tested are inherently more capable of discrimination than an heuristic comparison of separately estimated models. O'Reilly [W12] reports on a number of such tests using U.S. data. Nelson (1981) and Gordon (1980) have both tested the New Classical hypothesis that fluctuations in macroeconomic activity are due to lags in information about the aggregate price level against the alternative Neo-Keynesian hypothesis that these fluctuations are due to lags in the adjustment of wages and prices. Although their methodologies are different, both conclude that the adjustment lag hypothesis seems more consistent with the evidence.

Laxton (1983b) has also examined the relative abilities of the New Keynesian and the New Classical hypotheses to explain cycles in observed unemployment rates in Canada. He concludes that the former explanation is better supported by the data.

CONCLUSION, QUALIFICATIONS, AND HINTS OF CONVERGENCE

The literature surveyed by O'Reilly does not seem, on balance, to support the extreme New Classical position that prices would move rapidly even for fully anticipated or correctly interpreted nominal shocks. There appears to be an emerging consensus in the literature that institutional and other rigidities or inertias must form part of a model of short-run price determination even in models with fully rational expectations. Therefore, we conclude that the New Keynesian paradigms offer better explanations of observed monetary business cycle behaviour.

A number of qualifications to this general conclusion are nevertheless required. At the empirical level, the research program remains hampered by the problem that several key variables (in particular, expectations and full employment) are unobservable. This leads to a "joint-hypothesis" problem. For example, consider the New Classical proposi-

tion that only unanticipated monetary policy affects real variables. To test this a measure of unanticipated monetary policy must be developed. If the measure chosen is incorrect, then the New Classical proposition could be rejected even though true.¹⁸ Second, at the econometric level it is very difficult to determine whether prices move slowly because of institutional rigidities or because economic agents are simply slow to revise their expectations and set prices accordingly. This problem was mentioned above when considering the characteristics of the monetarist model, but it applies still more broadly than this.

At the theoretical level, it is important to note that our neat distinctions into schools of thought are less than watertight. Mistaken expectations about future prices may have initial effects on output, and then medium-run effects if these mistakes get built into longer-term wage contracts or irreversible capital investment decisions. Still more fundamentally, the very form of an institutional rigidity may be a response to past economic outcomes. For example, long-term wage contracts may dominate in periods of low inflation and small shocks, while short-term contracts may dominate when inflation is high and is presumed to be variable. The growing interest in “contract theory” indicates the extent to which this interdependence is considered to be an important qualification to our distinctions between various schools of thought.

Finally, although the academic literature tends to treat different paradigms as competing, they may in fact be complementary. Business cycles may occur because institutional rigidities constrain price movements and because price expectations change only slowly and because information lags cause expectations to be disappointed and because these mistakes lead to over- or underinvestment in new capital. For example, we would have no difficulty accepting such an eclectic explanation for the severe Canadian business cycle of 1981 and 1982.¹⁹ The literature itself also seems to be evolving in the direction of synthesis. Forward-looking price expectations variables (often based on assumptions about monetary policy) are increasingly appearing in models of the Neo-Keynesian type. In conjunction with this, New Classical models are beginning to incorporate selected rigidities.

Empirical Evidence on Price Determination and Business Cycles in Canada

This evidence is presented in a series of papers by Duguay [W4], Paulin [W13], Stuber [W18] and [W19], Roy and Coiteux [W15] and Simard [W16]. The analysis begins using a highly aggregated reduced-form model like that of Gordon, proceeds through a survey of large econometric models, and finishes with some more micro evidence. Since the Duguay and Paulin papers have a macro-orientation (full models) they can deal directly with the central issue of how the economy adjusts to

nominal shocks. The more micro papers deal with this question only tangentially, but are nevertheless of interest.

Our rather eclectic research strategy reflects the view that all empirical methodologies have their limitations. Reduced-form (and small structural) models have the principal advantage that they can capture broad trends and relationships among the data. Yet, much interesting detail can be lost since a reduced-form model can represent alternative structural models. In the case of larger structural models, these advantages and disadvantages tend to be reversed.

AN AGGREGATE APPROACH

Duguay [W4] follows the methodology of Gordon (1980) by first estimating the following equation for inflation:

$$\dot{p} = a(\dot{y} - \dot{q}^*) + b(L)\dot{p} + c(q - q^*) + u$$

where \dot{p} is the rate of inflation, y is the rate of growth of nominal spending, q^* is the rate of growth of trend output, $b(L)\dot{p}$ measures past rates of inflation, and $q - q^*$ is the deviation of the level of output from trend. He also goes on to consider the importance of supply variables (energy prices and measures of the terms of the trade) as well as various lag specifications, but these do not much alter his conclusions. Duguay's data set covers the period 1955–81. He uses Chow tests to investigate temporal stability of the coefficients as well as rolling regressions to observe the evolution of parameter estimates over time.

Duguay begins by stressing that his equation provides no explanation of inflation, rather it focusses attention on measuring how price and real output changes interact following a change in aggregate demand. The equation can also be used to address such other empirical issues as the relative influence on inflation of levels and changes in excess capacity, the role of inflationary expectations, the accelerationist hypothesis, the stability over time of all these relationships.²⁰ Duguay finishes his introduction with an extensive discussion of the econometric problems involved in estimating his regression,²¹ but subsequently concludes that this is not of much practical significance.

The regression results obtained over various time periods are presented in Table 3-8. The principal conclusion is the instability of the parameter estimates over time, a conclusion strongly supported by Chow tests and by a consideration of the parameters (Figures 3-8 and 3-9) generated by rolling regressions on a similar equation. Of particular note are the upward drift over time in the influence of lagged prices, and the fall in the influence of the gap in 1962 and 1982. Virtually all of these developments conflict with those of Gordon (1982), who observed a stable equation for the United States over the postwar period.²² It is also interesting to note, in comparing Duguay's results with Gordon's, that

TABLE 3-8 Estimation Results for a Reduced-Form Aggregate Price Equation: $\dot{p} = \pi + a (\dot{y}-\dot{q}^*) + c L (q-q^*) + b(L)\dot{p}$

Estimated Coefficients (Standard Error in Parentheses)									
	π	a	c	$b(L)^*$	b_1	b_2	b_3	b_4	b_5
1. 55Q1-62Q1 (29)	0.688 (0.317)	0.176 (0.090)	0.093 (0.042)	-0.854 (0.675)	-0.40 (0.18)	-0.15 (0.14)	-0.01 (0.16)	0.02 (0.15)	-0.06 (0.13)
2. 55Q1-63Q4 (36)	0.703 (0.261)	0.171 (0.070)	0.071 (0.032)	-0.751 (0.542)	-0.35 (0.15)	-0.11 (0.12)	0.01 (0.13)	0.03 (0.13)	-0.06 (0.11)
3. 62Q2-70Q2 (33)	1.411 (0.344)	0.096 (0.063)	0.200 (0.055)	-0.544 (0.373)	-0.50 (0.17)	-0.16 (0.11)	0.04 (0.11)	0.12 (0.11)	0.07 (0.09)
4. 64Q1-72Q4 (36)	1.190 (0.385)	0.094 (0.081)	0.229 (0.056)	-0.231 (0.380)	-0.40 (0.17)	-0.11 (0.10)	0.07 (0.11)	0.15 (0.10)	0.11 (0.09)
5. 73Q1-81Q4 (36)	0.026 (0.567)	0.357 (0.085)	0.231 (0.099)	0.591 (0.174)	0.16 (0.13)	0.12 (0.05)	0.09 (0.06)	0.08 (0.07)	0.07 (0.06)
6. 70Q3-81Q4 (46)	0.206 (0.259)	0.311 (0.071)	0.248 (0.070)	0.560 (0.111)	0.12 (0.11)	0.11 (0.05)	0.10 (0.06)	0.09 (0.06)	0.08 (0.05)
7. 67Q1-81Q4 (60)	0.186 (0.171)	0.304 (0.059)	0.273 (0.061)	0.569 (0.089)	0.08 (0.10)	0.10 (0.04)	0.11 (0.05)	0.11 (0.05)	0.09 (0.04)
8. 64Q1-81Q4 (72)	0.224 (0.140)	0.310 (0.054)	0.218 (0.050)	0.554 (0.081)	0.11 (0.09)	0.12 (0.04)	0.11 (0.05)	0.10 (0.05)	0.08 (0.04)
9. 62Q2-81Q4 (79)	0.324 (0.136)	0.280 (0.050)	0.145 (0.039)	0.550 (0.080)	0.17 (0.09)	0.14 (0.04)	0.12 (0.05)	0.08 (0.05)	0.04 (0.03)
10. 58Q1-81Q4 (96)	0.386 (0.116)	0.272 (0.044)	0.134 (0.032)	0.525 (0.076)	0.09 (0.08)	0.15 (0.04)	0.16 (0.05)	0.13 (0.05)	0.06 (0.03)
11. 55Q1-81Q4 (108)	0.140 (0.096)	0.308 (0.043)	0.069 (0.025)	0.613 (0.070)	0.11 (0.08)	0.17 (0.03)	0.18 (0.04)	0.15 (0.04)	0.07 (0.03)

*Second degree Almon Lag with no head or tail constraint.

Estimated Coefficients (Standard Error in Parentheses)					Summary Statistics					
					Intra-Sample			1982Q1–1983Q2		
		b ₆	a/(1 – b(L))	Mean (std. dev)	R ²	see	DW	SSR	ME	RMSE
1.	55Q1–62Q1 (29)	–0.25 (0.16)	0.095 (.073)	0.422 (0.745)	0.356	0.598	2.0	8.230	—	—
2.	55Q1–63Q4 (36)	–0.27 (0.14)	0.098 (.059)	0.431 (0.673)	0.342	0.546	2.0	8.948	—	—
3.	62Q2–70Q2 (33)	–0.12 (0.16)	0.062 (.044)	0.847 (0.466)	0.496	0.331	2.2	2.951	—	—
4.	64Q1–72Q4 (36)	–0.04 (0.15)	0.076 (.074)	0.990 (0.510)	0.356	0.409	2.0	5.017	—	—
5.	73Q1–81Q4 (36)	0.07 (0.12)	0.873 (.444)	2.482 (0.785)	0.521	0.543	1.5	8.843	1.814	1.851
6.	70Q3–81Q4 (46)	0.07 (0.10)	0.707 (.210)	2.181 (0.943)	0.673	0.539	1.8	11.613	1.867	1.902
7.	67Q1–81Q4 (60)	0.07 (0.09)	0.705 (.157)	1.912 (0.987)	0.731	0.512	1.8	14.174	2.036	2.071
8.	64Q1–81Q4 (72)	0.04 (0.08)	0.695 (.134)	1.736 (0.996)	0.749	0.499	1.9	16.450	1.639	1.674
9.	62Q2–81Q4 (79)	–0.04 (0.08)	0.622 (.122)	1.624 (1.020)	0.757	0.502	2.0	18.427	1.059	1.113
10.	58Q1–81Q4 (96)	–0.06 (0.07)	0.573 (.097)	1.397 (1.079)	0.766	0.522	2.0	24.481	0.968	1.027
11.	55Q1–81Q4 (108)	–0.07 (0.07)	0.796 (.135)	1.301 (1.091)	0.732	0.565	2.1	32.534	0.493	0.687

*Second degree Almon Lag with no head or tail constraint.

FIGURE 3-8 Lagged Prices Coefficients

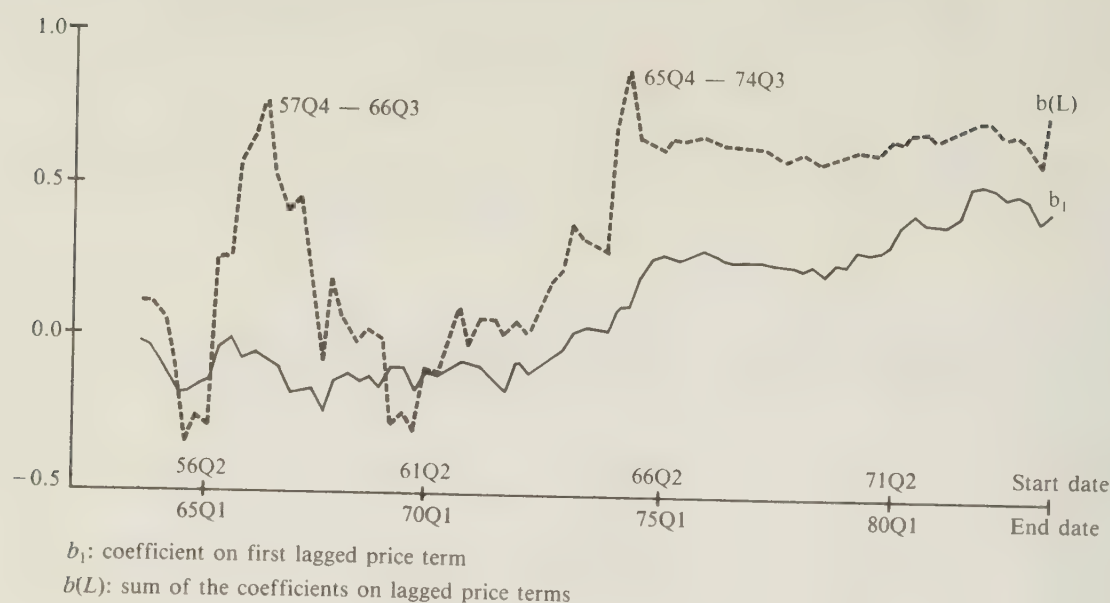
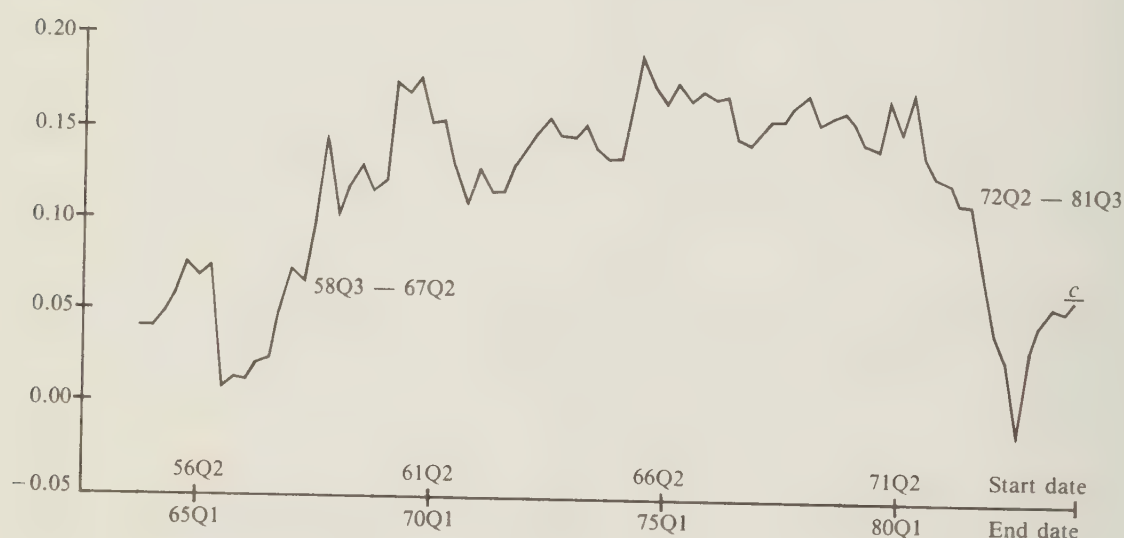


FIGURE 3-9 Coefficient of the GAP



there appears to be in Canada a much steeper short-run Phillips curve and a much smaller (if still substantial) degree of inertia in the price formation process.²³

The parameters in Table 3-11 indicate that, on average over the most recent period (1973Q1–81Q4), about 35 percent of a nominal shock would have gone into prices in the first quarter, and this would have risen over time to 87 percent. (In terms of magnitude these figures compare well to those obtained by Gordon.) The former figure seems to suggest strongly that nominal shocks do have real effects. While the latter figure is still less than one, and therefore inconsistent with the accelerationist hypothesis, the difference is not statistically significant. In any event, as

discussed immediately below, the accelerationist hypothesis requires that all prices (including the exchange rate) and costs move proportionally in response to nominal shocks. It could be that, over the very specific time frame considered by Duguay, this requirement was not met.

EVIDENCE FROM LARGE, STRUCTURAL MODELS OF THE CANADIAN ECONOMY

Paulin [W13] throws further light on the adjustment process of prices and output to nominal shocks by examining the characteristics of eight large econometric models of the Canadian economy: quarterly models of the Bank of Canada (RDXF), the Department of Finance (QFS), the University of Toronto's Institute for Policy Analysis (FOCUS), and Data Resources Incorporated (DRI), and annual models of the Economic Council of Canada (CANDIDE 2.0), the University of British Columbia (MACE), and the Bank of Canada (SAM), and Informetrica (TIM). By way of introduction, Paulin provides a discussion of the structure and short-run dynamics of a "typical" wage/price block in which wages are of the augmented Phillips curve type and prices are determined on a cost-plus basis. He then goes on to discuss the elements required in such models (from the perspective solely of the wage/price block) to obtain "accelerationist" results.²⁴ With this as background, Paulin goes on to consider more specifically the wage/price blocks of each of the models being analyzed. Again, the issues of short-run dynamics and the requirements for long-run price determination are the central focus of attention. Finally, Paulin looks at full model characteristics by examining the response of each of these models to several of the nominal shocks specified at a recent conference on comparative models held at the Bank of Canada.²⁵

Paulin's investigations into the structural properties of the eight models indicate broad adherence to a Neo-Keynesian view. The wage equations tend to be of the expectations-augmented Phillips curve type and prices are determined on the basis of markups over costs. Accordingly, an important role is played by excess demand in determining prices, and there is a substantial degree of price-wage inertia present. This implies that nominal demand shocks do set up a wage/price spiral.

Yet there are some interesting points of differences among the wage/price blocks considered. While labour costs still play a dominant role in most price equations, growing attention seems to be being paid to such other variables as energy costs and capital costs.²⁶ There has recently been a trend as well (QFS, MACE and SAM) to considering the difference between actual and desired inventories as a stock measure of the direct pressure of excess demand on prices in addition to the usual flow measures. As to wage-setting behaviour, substantial support is provided by all the models for the proposition that there is no money illusion on

the part of wage earners; when this property is not imposed it generally emerges from empirical estimates. Inflation expectations are generally modelled using distributed lags on past prices, though some modellers have also attempted to define a more “rational” process by incorporating changes in the money supply (CANDIDE, SAM and FOCUS). Indeed, FOCUS goes further by including a number of additional determinants of price expectations which also provide potential for expectational errors and feedback effects on the real economy. SAM goes further still by assuming prices and wages respond directly to gaps between actual levels and model-generated steady-state equilibrium levels. In this SAM is unique and particularly interesting. All these developments presumably reflect some adaptation of the broad Neo-Keynesian approach to the insights provided over the last few years by research in the New Classical tradition. As stated at the end of the review of literature on price determination and business cycles, some convergence of views seems to be emerging.

As to accelerationist properties, most of the models (SAM is the exception) do not appear to have this property if judged on the basis of their wage/price blocks alone. This is a product variously of the complete exogeneity of some prices (particularly energy and food) or the presence of money illusion with respect to the determination of non-labour factor costs. In some models the longer-run rigidity of import prices also plays a role, reflecting the fact that the exchange rate responds less than proportionally to domestic price increases. However, in other models (e.g., RDXF and QFS) purchasing-power parity terms are included in their exchange rate equations to ensure such proportionality.

To sum up, the wage/price equations in all these models are highly interdependent and individually subject to long lags. While the potential seems to exist for a substantial degree of wage-price spiralling given deviations from full employment, the extent of this tends to fall short of the accelerationist result given the exogeneity of some prices in most models. This should not therefore be treated as a result inconsistent with the accelerationist hypothesis.

Paulin also reports the results of a number of full-model simulations of nominal shocks. In Table 3-9 we present Paulin’s results from simulations involving a permanent 1 percent reduction in the rate of growth of the money supply, as defined in the various models. The interest rate changes required to lower the money growth rate vary significantly across the models and generally imply rising real (ex post) interest rates over time. Only in SAM does one see, after ten years, the reduction in nominal rates expected in an environment of declining inflation. Real output is initially affected in all models and in most cases this effect persists over the whole simulation period. Inflation does decline in response to lower money growth and after ten years is roughly 1 percent lower in five models (QFS, FOCUS, RDXF, SAM and MACE) of the seven

considered. Of the five, the shift varies from -0.65 for MACE to -1.23 for SAM. The price response of the DRI and CANDIDE models is much less, perhaps reflecting the input-output character of their price sectors as suggested above.²⁷

Paulin also considers the implication of his nominal shock for real wages, and concludes that here as well the effects carry on for a long period. A decline in the money supply growth rate at first causes real wages to increase as prices initially fall faster than wages (principally via the exchange rate). Over time, however, nominal wages catch up and eventually surpass prices. This property would not be expected over the long run (assuming no change in the real interest rate is involved) where real wages should be determined by real factors, but it likely emerges due to the incomplete pass through of costs to prices in most of these models. There is also scope for real wage losses given that output has also not returned to control, even after a ten-year period. This variation in real wages also has implications for profits, though Paulin notes that the effects vary substantially depending on the model being considered. In the short run, profits fall in all the models as output (and productivity) declines and real wages lag. Over the longer run, profits continue to drop substantially in most of the models for which they are reported.²⁸

INDUSTRY-SPECIFIC EFFECTS

Both Ferley, O'Reilly and Dunnigan [W5] and Armstrong [W2] extended the use of their methodologies to investigate whether there are differences between the cyclical behaviour of prices in particular product groups. Stuber also contributed two papers, [W18] and [W19], using a quite different approach to shed light on the issue of industry-specific pricing. In reporting the results of these investigations we continue to stress those that appear to be common under different methodologies. We also remind the reader that there are a number of alternative approaches that have not yet been investigated and that could yield different conclusions.

Armstrong [W2] provides some initial justification for investigating industry-specific effects. He computes Spearman rank correlation coefficients between sets of price change measures for various pairs of recessions. The hypothesis under test is that, in the absence of a product market effect, there would be no tendency for a price change measure for a particular product to lie below the average change in one recession simply because it was below the average change in another recession. These Spearman tests indicated a strongly significant industry-specific effect. That is, some industries have consistently less and others consistently more price movement than the average over business cycles. To pursue the industry-specific effects further, we turn to the findings of the above-mentioned studies with respect to the specific influence on

**TABLE 3-9 Effect of a 1 Percent Reduction in Money Supply Growth Rate
(Percentage Difference Between Shock and Control)**

	Quarterly Models (mnemonic for model)				Annual Models		
	Bank of Canada (RDXF)	Department of Finance (QFS)	University of Toronto (FOCUS) ^a	Data Resources Incorporated (DRI)	Economic Council of Canada (CANDIDE 2.0)	University of B.C. (MACE)	Bank of Canada (SAM) ^b
Real gross national expenditure (%)							
Year 1	-0.10	-0.07	-0.09	-0.16	-0.02	-0.31	0.00
3	-0.64	-0.19 (Yr. 2)	-0.75	-0.62	-0.38	-1.24	-0.04
10	-0.86	-0.58	-2.13	-1.13	-2.00	-2.73	-0.03
10 ^{gc}	-0.08	0.01	-0.38	-0.06	-0.05	-0.38	0.00
Unemployment rate (level change)							
Year 1	0.03	0.02	0.03	0.06	0.07	0.07	0.01
3	0.40	0.15	0.40	0.58	0.14	0.33	0.03
10	0.35	0.79	0.98	0.64	-0.09	0.22	0.06
GNP Deflator (%)							
Year 1	-0.00	-0.03	-0.12	0.16	-0.44	0.16	-0.03
3	-0.61	-0.19	-1.44	-1.34	-1.44	-0.23	-0.63
10	-4.57	-4.85	-7.09	-4.62	-3.30	-5.40	-7.61
10 ^{gc}	-0.77	-1.00	-0.96	-0.19	0.21	-0.65	-1.23
Consumer price index (%)							
Year 1	0.00	-0.09	-0.16	-0.17	-0.53	0.05 ^d	-0.01
3	-0.59	-0.31	-1.58	-1.95	-1.56	-0.47	-0.73
10	-4.41	-4.74	-6.35	-5.38	-2.78	-5.27	-8.36
10 ^{gc}	-0.67	-0.90	n.a.	n.a.	n.a.	n.a.	n.a.

domestic price flexibility of government regulation, industrial concentration and foreign competition.

Government Regulation

Price series for regulated industries in the CPI were identified using the criteria laid out by Wilson (1982) at Statistics Canada. In 1983 regulated prices comprised some 25 percent of the CPI; their historical performance can be seen in Figure 3-10. Since such prices are set administratively, there is a presumption that they may be less cyclically sensitive than other prices on average or, at the least, that the lags between regulated prices and business cycle movements may be different than for unregulated prices. The evidence in Figure 3-10 indicates a delay in the turning points of regulated prices but does not suggest less cyclical sensitivity. The delay would be lengthened to the extent that regulated prices are set to obtain a "fair" rate of return on investment. During business downturns, increases in average total costs might argue more for price increases rather than decreases in such industries. Ferley, O'Reilly and Dunnigan, Armstrong, and Stuber have all considered the influence of regulation on prices. Roy and Coiteux [W15] have also prepared a paper on the more specific type of rate-setting behaviour by Canadian utilities. This paper is described in more detail later in the section of this paper on other micro evidence.

Ferley, O'Reilly and Dunnigan apply their methodology to the evaluation of the cyclical flexibility of the regulated CPI, the regulated CPI less energy, and the non-regulated components of the CPI. In contrast to the impression given by Figure 3-10 they conclude that regulated prices *are* generally less cyclically sensitive than non-regulated prices, and this is particularly true when energy prices are excluded (Table 3-10). Armstrong applies his methodology to separate groups of 21 regulated and 76 unregulated prices (all from the CPI) and reaches a similar if weaker conclusion. Because many commodities that are regulated today were not regulated prior to 1970, he considers only the last three recessions. Armstrong provides statistically significant evidence that unregulated prices dropped further than regulated prices during the recession of 1981/82 and on the basis of weaker evidence concludes that this occurred in 1979/80 as well. Armstrong draws the latter conclusion on the basis of the fact that his contradictory tabular results reflect a few extreme outliers.

The apparent inconsistency between an eyeball test of Figure 3-10 and the Ferley/O'Reilly/Dunnigan and Armstrong results reflects an ambiguity in the Cagan-Sachs methodologies used by these researchers. In that the Cagan-Sachs measures focus on the difference between the inflation rates in the recession period and the preceding expansion period, they pick up both how fast and how much prices respond *ex post* to an officially identified business cycle. Therefore, the phasing problem men-

FIGURE 3-10 Comparative Performance of Regulated Prices

(annual percentage change)

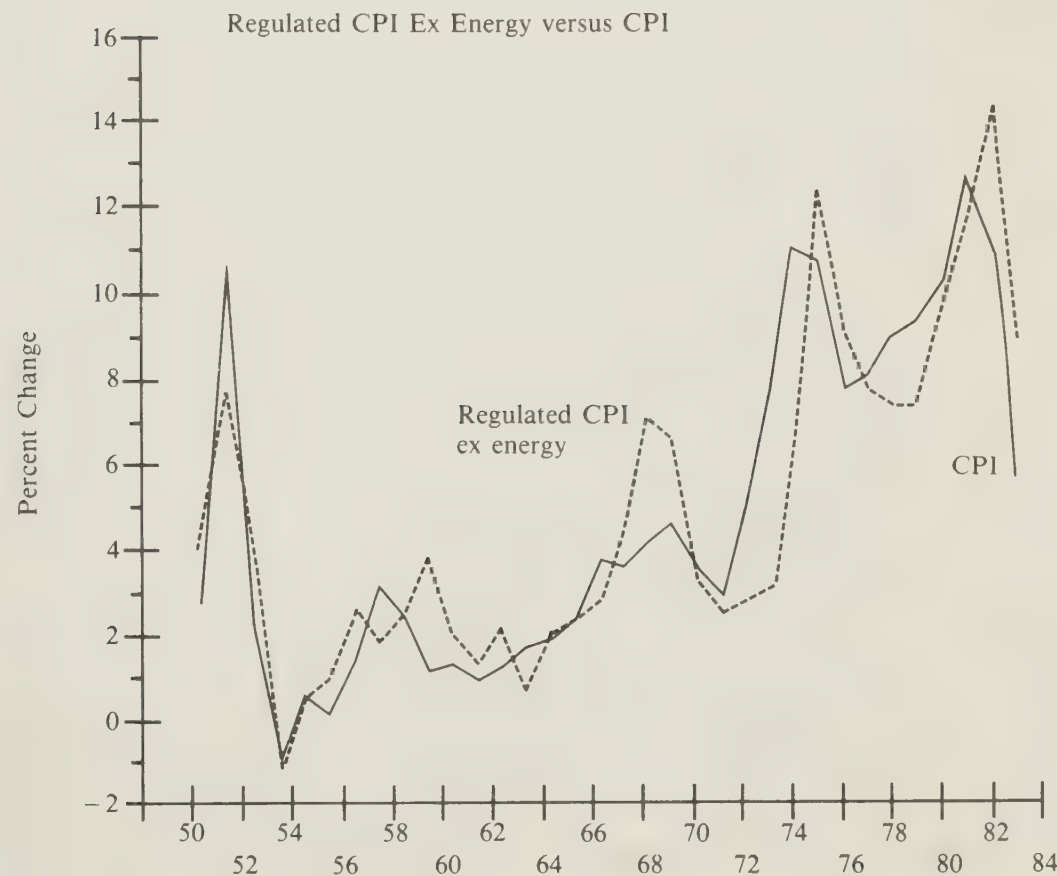
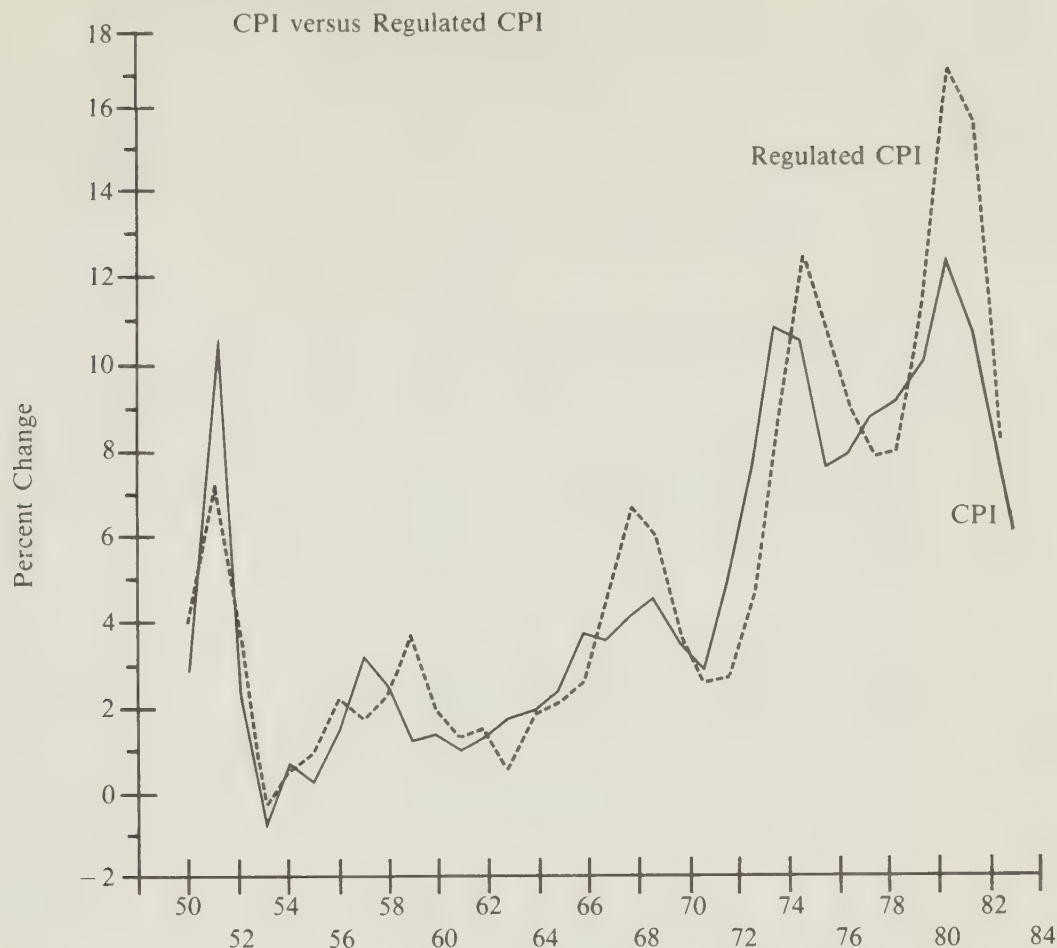
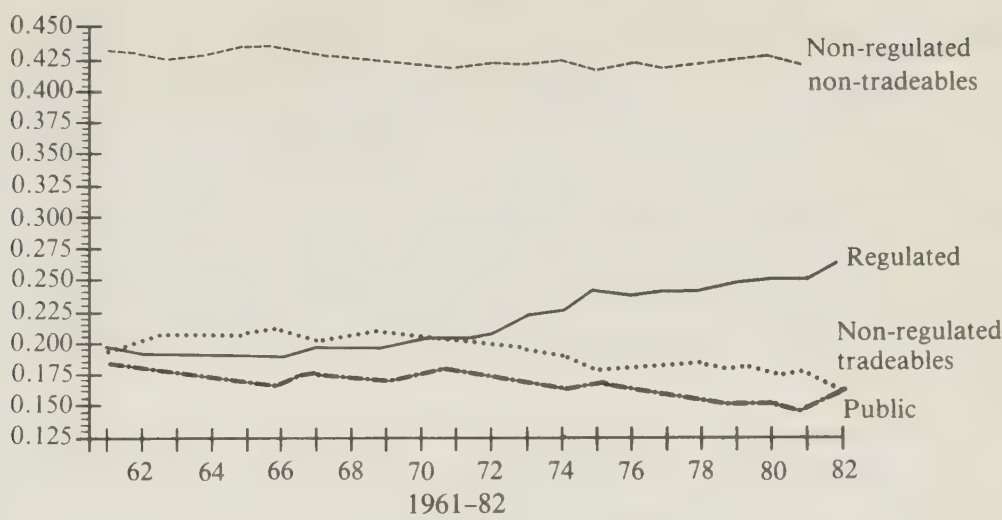


TABLE 3-10 Annual Rate of Change of Prices in Postwar Business Cycles

Reference Cycles			Consumer Price Index Regulated (UA)			Non-Regulated (UA)			Regulated ex energy (UA)		
Trough	Peak	Trough	Expansion ^a	Recession	Rec -Ex.	Expansion ^a	Recession	Rec -Ex.	Expansion ^a	Recession	Rec -Ex.
1949:Feb.	1951:May	1951:Dec.	+7.4	+7.6	+0.2	+11.8	+8.4	-3.4	+7.8	+8.0	+0.2
1951:Dec.	1953:May	1954:June	-0.9	+1.0	+1.9	-1.5	+1.0	+2.5	-1.4	+1.1	+2.5
1954:June	1957:Jan.	1958:Jan.	+1.8	+2.3	+0.5	+3.5	+2.4	-1.1	+2.2	+2.4	+0.2
1958:Jan.	1960:Mar.	1961:Jan.	+2.8	+1.5	-1.3	+1.1	+2.0	+0.9	+3.0	+1.6	-1.4
1961:Jan.	1974:May	1975:Mar.	+9.4	+10.9	+1.5	+11.3	+10.5	-0.8	+6.1	+11.7	+5.6
1961Q1	1966Q1	1968Q1	+2.1	+5.0	+2.9	+3.7	+3.5	-0.2	+2.5	+5.0	+2.5
1968Q1	1969Q4	1970Q4	+6.9	+2.8	-4.1	+4.1	+2.0	-2.1	+7.6	+2.0	-5.6
1970Q4	1974Q1	1975Q1	+6.5	+12.0	+5.5	+10.6	+11.5	+0.9	+3.7	+12.0	+8.3
1975:Mar.	1979:Oct.	1980:June	+8.8	+11.7	+2.9	+9.6	+10.2	+0.6	+7.8	+10.7	+2.9
1980:June	1981:June	1982:Dec.	+17.5	+12.9	-4.6	+11.2	+7.9	-3.3	+10.9	+13.6	+2.7

a. The inflation rate during the expansion was calculated as the annualized rate of change between the peak and one year before the peak.

FIGURE 3-11 Structure of Canadian Economy
(percentage of total GDP)



tioned above in the discussion of an aggregate approach can mask price responses that are large but delayed. It is also worth recalling here the earlier work of Wilson (1982) and McGirr (1982). It was concluded in both papers that regulated CPI prices lag movements of non-regulated prices over the economic cycle, even if the magnitude of the movements is not necessarily different over a complete cycle.

Stuber's work [W18] differs essentially from that presented in the above studies in that he assumes a specific model of price determination which he estimates using constructed industry-specific gross output price deflators, measures of normalized unit costs (labour, energy and raw materials), and capacity utilization rates. Using criteria based on those of Stanbury and Thompson (1980) he distinguishes between regulated (including regulation of entry and output as well as price) and non-regulated industries. As Figure 3-11 indicates, the share of GDP produced by regulated industries has been increasing (especially during the 1970s) with about half the increase accounted for by new regulation and the other half by the relatively faster growth of industries regulated prior to 1961.²⁹ It is also worth noting that, although price inflation appears from the data to be less cyclically variable in regulated than non-regulated industries, the output cycles seem to be much less severe as well.

Stuber then goes on to estimate industry-specific pricing equations of the cost-plus variety using both time series (aggregate equations for regulated, tradeable non-regulated, and non-tradeable non-regulated) and cross-section regressions. The time-series results indicate that price inflation in the regulated sector does tend to react with a longer lag to changes in normalized unit costs, relative to the non-regulated sectors. Stuber's time-series regressions indicate no differences between regulated and non-regulated industries with respect to the impact of capacity

utilization on price changes. Stuber also estimated separate cross-section equations for each year over the 1964–79 period, again distinguishing between regulated and non-regulated industries. He obtained a positive sign for the capacity utilization variable (his cost-plus model should have yielded a negative sign) but found, contrary to the time-series results above, that regulated sector prices seemed to be more responsive to unit cost changes. One speculation based on this latter result was that regulated industries are more likely to be able to pass through cost increases despite the economic circumstances. The results from profit margin equations (time-series and cross-sectional) suggested that profit margins in the regulated sector have been less sensitive to cyclical influences, especially relative to the non-regulated tradeable sector.

To summarize the evidence drawn from the papers considered above, we conclude that prices in regulated industries seem to lag the business cycle more than non-regulated prices. Although the deceleration in prices during recessions seems less marked for regulated industries, Stuber suggests that this may be because output fluctuations are also less marked in these sectors. Neither the Ferley, O'Reilly and Dunnigan nor the Armstrong methodologies control for this. Finally, it should be noted that regulated industries are not uniformly distributed with respect to other potentially relevant "market structure" variables. Thus, the possibility exists that apparent "regulated industry effects" are in fact due to other factors.

Industry Concentration

It is sometimes suggested that firms in highly concentrated industries will cooperate to "administer" prices, and that this may reduce cyclical price flexibility. The empirical literature surveyed by Stuber [W19] provides general if not universal support for this hypothesis using data from other countries. So too does the study by Encaoua (1983). Stuber also presents information on the degree of industrial concentration in Canada. As Table 3-11 indicates, it seems sufficiently high to warrant investigation of the hypothesis using Canadian data.

Ferley, O'Reilly and Dunnigan [W5] apply their methodology to Industry Selling-Price Index (ISPI) components distinguished as high, medium or low concentration on the basis of the proportion of industrial production accounted for by the leading eight firms in that sector. Although the authors make only a few observations, they note that highly concentrated industries actually seem to exhibit relatively more sensitive prices than less concentrated industries. However, this apparently anomalous result may be attributable to the fact that the highly concentrated category contains petroleum and coal-refining and primary metal industries, all of which may be subject to influences other

TABLE 3-11 Classification of Selected Manufacturing Industries According to Concentration Ratios, Percent of Total Manufacturing Production in 1981 in parentheses

Low (0-39.9%)	Medium (40-59.9%)	High (60-100%)
Knitting mills (0.8)	Meat and poultry products (2.0)	Distilleries (1.0)
Men's clothing (1.1)	Soft drinks (0.8)	Iron and steel mills (3.8)
Women's clothing (1.3)	Veneer and plywood mills (0.5)	Smelting and refining (2.2)
Sawmills, planing mills and shingle mills (2.7)	Paper box and bags (1.2)	Aircraft and aircraft parts (1.9)
Sash, door and other millwork plants (1.0)	Publishing and printing (3.2)	Motor vehicles and parts (8.1)
Household furniture (1.0)	Iron foundries (0.4)	Major appliances (0.6)
Commercial printing; platemaking, typesetting and trade bindery (2.9)	Metal stamping, pressing and coating (1.9)	Household radios and TVs (0.5)
Hardware, tool and cutlery (1.0)	Wire and wire products (0.9)	Petroleum refineries (1.0)
Machinery (6.6)	Communications equipment (2.5)	Soap and cleaning compounds (0.7)
Dairy products (1.4)	Electrical Industrial equipment (1.5)	Breweries (1.4)
Fruit and vegetable processing (0.8)	Concrete products (0.5)	Cotton yarn and cloth (0.4)
Bakery products (1.0)	Ready-mix concrete (0.5)	Cement (0.5)
Miscellaneous food (2.5)	Industrial chemicals (1.9)	
Pulp and paper (5.4)	Scientific and professional equipment (1.2)	
Truck body and trailers (0.5)	Man-made fibre, yarn and cloth (1.7)	
Pharmaceuticals and medicines (1.3)		
Paint and varnish (0.5)		
Miscellaneous chemicals (1.1)		
Total share ^a	32.9	20.7
		22.1

a. These do not add to 100 percent since only selected manufacturing industries were used.

than Canadian output cycles, for example, government regulation and vigorous international competition.

Stuber [W19] classifies selected manufacturing industries into three concentration groups on the basis of four-firm concentration ratios (see Table 3-11) and calculates aggregate price and output measures. He observes that price variability over time seems to be least for the medium concentration groups and higher for industries with both lower and higher degrees of concentration. The fact that cyclical changes in production tended to be largest for the high concentration group might help explain the larger price variability.³⁰ As in his study of regulated prices, Stuber calculates series for prices, normalized unit costs, capacity utilization and four-firm concentration ratios for 122 manufacturing industries using annual data from the period 1961–79. He estimates separate cross-section regressions for each year using all these variables, and notes that the coefficient of the normalized unit cost variable was generally highly statistically significant and also tended to be considerably larger for years near the peak or trough of the business cycle. The coefficient of the capacity utilization variable was negative. However, the coefficient on the concentration ratio was almost always statistically insignificant, a result providing little support for the administered pricing hypothesis. These results were not altered significantly when an attempt was made to control for import penetration and export orientation along the lines suggested by Jones and Laudadio (1977) and Encaoua (1983).

To summarize, there is little evidence that the degree of domestic concentration affects the pricing behaviour of manufacturing industries over the cycle. It may still be the case that oligopolists try to administer prices in response to industry-specific costs, but the extent to which they succeed may diminish in the face of a widespread cyclical downturn. Moreover, many Canadian industries face actual and potential external competition. In this case, even a firm that is the sole Canadian supplier of a good may have little power to administer prices.

Foreign Competition

The issue of foreign competition is treated directly by Ferley, O'Reilly and Dunnigan [W5], Armstrong [W2], and Stuber [W18], who all classify industries as open, closed, import competing and export oriented using criteria specified by Clinton and Hannah (1982). Stuber notes that between 1966 and 1982 the Canadian manufacturing sector showed a tendency toward both rising import penetration and increased export orientation (see Table 3-12). In many industries both tendencies have been observed simultaneously, which supports a hypothesis of increasing specialization in the world manufacturing sector.

Applying their methodology to ISPI data classified as described above,

TABLE 3-12 Changes in Trade Orientation for Selected Manufacturing Industries

	1966	1979	1982
Import Penetration (imports as a percent of total domestic sales)			
Manufacturing	21.0	32.6	29.8
Rubber	13.4	29.9	27.1
Leather	14.4	33.4	36.1
Man-made fibres	22.7	40.8	40.1
Knitting mills	11.3	30.5	28.8
Clothing	5.1	12.2	15.0
Aircraft and parts	40.5	73.7	53.2
Motor vehicle manufacturing	23.7	63.1	86.7
Motor vehicle parts	70.7	100.4	100.1
Small electrical appliances	30.0	54.9	55.5
Major appliances	13.5	25.6	23.8
Household radios and TVs	22.9	78.0	69.9
Communications equipment	33.1	53.0	49.5
Export Orientation (exports as a percent of total shipments)			
Manufacturing	18.8	30.3	31.4
Rubber	3.0	16.6	28.0
Man-made fibres	6.3	12.1	17.4
Aircraft and parts	47.7	69.6	63.0
Motor vehicle manufacturing	27.4	66.4	93.8
Motor vehicle parts	48.7	100.8	100.3
Major appliances	6.1	18.7	22.2
Household radios and TVs	11.3	40.5	26.9
Communications equipment	16.4	36.1	42.6

Source: Department of Industry, Trade and Commerce and Regional Expansion, *Manufacturing Trade and Measures 1966-1982* (Ottawa, 1983).

Ferley, O'Reilly and Dunnigan present evidence that prices in export-oriented industries do seem to have the strongest relationship with business cycle movements.³¹ They also provide evidence that components of the CPI that have a high import content also appear to have a stronger relationship to cyclical movements than do other components of the CPI. Conversely, Ferley, O'Reilly and Dunnigan also record that the prices of open industries show the opposite behaviour, actually rising more in contractions than recessions. The application of Armstrong's methodology also provides some conflicting results. On the one hand, ISPI prices in the export-oriented category were generally significantly more closely linked to business downturns than prices in the import-competing and closed groups. The degree of relative price variability within the import-competing group in the ISPI was also particularly large. On the other hand, when Armstrong considered CPI data, he found no consistent evidence that the prices of import-competing products are any more or less related to cycles than other CPI prices. Nor is there any evidence that the relative prices of import-competing products

have been more variable than the relative prices of other products (i.e., both the mean and dispersion of price changes for import-competing products are similar or comparable to those of other products).

Stuber estimates annual cross-section pricing equations like those described above, but he introduces variables measuring the degree of import competition and export orientation by industry. In general he finds no evidence that these variables are statistically significant. Stuber also examines the cyclical variability of prices and outputs in seven selected industries which experienced at least some increase in import penetration over the 1966–82 period. While his analysis is rather descriptive, the initial interpretation is that rising import competition did not appear to have any significant effect on cyclical price variability. However, Stuber qualifies this conclusion by noting that a contributing factor may have been the imposition of import quotas in a number of these industries where import competition was very strong.

To summarize, the evidence is mixed. However, the balance of this evidence seems to us to suggest that sectors exposed to foreign competition, especially those that are export oriented, do exhibit a different pattern of cyclical price response. Whether one should interpret this as evidence of domestic rigidities remains an open question. It seems almost inevitable that business cycles in foreign countries, especially the United States, will be transmitted to Canada. In part, this will occur through the prices of importables and exportables. The observed relationship between prices and cycles in these sectors may thus reflect the economic structure of the United States as much as that of Canada.

OTHER MICRO EVIDENCE

In this section, reference is made to some preliminary work by Roy and Coiteux [W15] and Simard [W16]. This research was motivated (in part at least) by a desire to understand better the extent to which higher interest rates may increase costs, thus reducing the overall deflationary impact of a downward nominal shock.

Roy and Coiteux look directly at price-setting practices in Canadian electric and natural gas utilities and the role played by interest costs. These industries are highly capital intensive and highly regulated, characteristics that might be presumed to lead to a direct positive link between interest rates and prices. Roy and Coiteux consider the current ownership structure of these industries (divided separately into electric utility, gas distribution, and gas and oil transporter sectors), how they are regulated, and the channels through which interest rates affect their total costs. They conclude that higher interest costs could push up prices in these industries (especially electricity) given the assumptions of full cost pass through and maintained target rate of return. Their investigations reveal, however, that both these assumptions are questionable to

some degree. Full cost pass through is not generally observed, perhaps owing to fears of reduced energy demands on average, as well as competition among different energy sources. As to target rates of return, historical experience indicates that rates of return for private utilities are commonly allowed to fall when interest rates rise. For public utilities, rate of return measures are not often considered. Other financial criteria used to determine utility rates are also subject to interpretation. Their final conclusion is that higher interest rates will push up some costs, but that the link with utility rate changes is not as stable as some suggest. This would also explain the great difficulty generally observed in finding significant econometric relations between electricity rates and capital costs.

Simard's paper has a much broader objective and is essentially an evaluation of the direction that further modelling work on industrial price formation in Canada might take. He examines, in particular, the advantages and disadvantages of constructing a stage-of-processing model. This model would involve classifying industries according to the relative proportion of their total costs arising from factor inputs (labour, capital and raw materials) and other manufactured inputs. The principal advantage of such a model is that it can take explicit account of industry-specific price behaviour (some industries are price takers, others administer prices, etc.). It also relates prices to all costs, not just some costs, and thus may give a more realistic description of the adjustment process. While Paulin's comments above imply that increasing attention is being given to such considerations in large macro models, the approach followed has tended to be ad hoc and assumes a substantial homogeneity of behaviour across industries. The principal disadvantage of the approach suggested by Simard is the implied increase in size of the macro model in which the stage-of-processing price sector must be imbedded. This implies in turn a reduced probability that the full model will possess such desirable characteristics as money neutrality.

Perhaps the principal conclusion to be drawn from Simard's investigation is that our knowledge of how prices are actually determined at the industrial level remains limited. To this extent, existing macro models must be interpreted as something of "a black box," and their results should be treated with appropriate caution.

Implications of More Rapidly Adjusting Prices

The evidence above does seem to support the view that price rigidities have the potential to exacerbate business cycles arising from nominal shocks. In this section we pursue these matters further by presenting empirical estimates of the implications of "rigidities." Our chosen methodology is to shock standard versions of macroeconomic models available at the Bank of Canada (RDXF and SAM). We then change the

model structure to represent a lesser or greater degree of rigidity and re-simulate under the same shock. The difference in model behaviour is attributed to the structural change.

The advantage of this testing is that the econometric models are thought to embody information about the historical behaviour of the Canadian economy. The disadvantage stems directly from what has become known as the Lucas critique. Lucas (1976) observed that parameter estimates reflect the average response to all the shocks in the economy which affected the dependent and independent variables over the data period. The response to an individual (policy) shock could well be quite different from that implied by the estimated model. This kind of argument would seem to apply even more forcefully when the policy considered is actually directed to changing the structure of the economy. The implications of structural change in the real world could well extend much further than the limited changes made to structural equations in our models. This criticism is more appropriate for shocks using RDXF. In SAM the linkages between output cycles and prices are more complex, allowing a wider range of possibilities to be analyzed. In particular, expectations are specified separately from adjustment terms so the possibility that structural reforms may affect inflationary expectations can be considered explicitly.

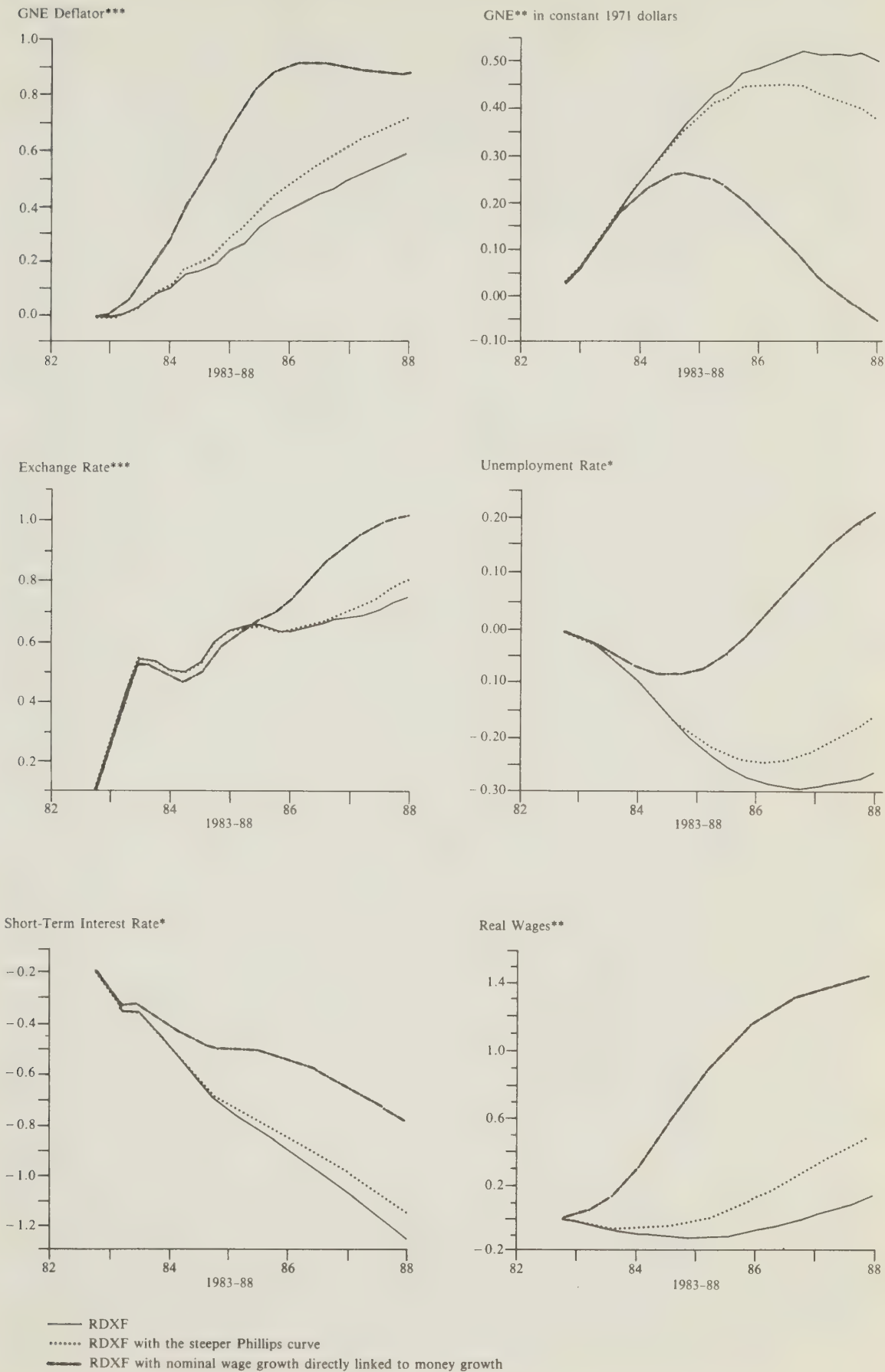
RDXF

Aubry and Acheson [W3] analyze the response of RDXF to monetary shocks (upward shocks to levels and growth rates) using alternative short-run slopes for the Phillips curve. The standard version of this Neo-Keynesian model has a "typical" wage/price block as described by Paulin [W13] and, as noted above, the exchange rate equation contains a purchasing-power parity term. In the standard version of RDXF, price expectations in the Phillips curve are proxied by lags on past inflation. However, Aubry and Acheson also consider a version of the model in which price expectations are directly linked to a distributed lag of money growth.

The principal results of these simulations are presented in Figure 3-12. A 1 percent increase in the growth rate of M1 beginning in mid 1983 increases inflation by 50 basis points in 1988 while the Canadian dollar is depreciating 0.6 percent per annum. The output response peaks in 1987 (0.5 percent growth), and only then does the unemployment rate (which has fallen) begin to rise back to control. The principal sectors through which the expansion occurs are housing, investment, and an improvement in the trade balance generated by the depreciation of the dollar. Consumption actually falls in RDXF as lower interest rates reduce real transfers and disposable income. With a steeper Phillips curve the price response is larger, and the output and employment rate response is smaller.

FIGURE 3-12 RDFX Response to a One Percent Increase in the Money Supply Growth Rate

(shock-control, level*, percent**, growth rate***)



When nominal wages are constrained to react directly to the monetary aggregates (one to one, but lagged), the effect is to moderate the output cycle and to increase the effect on prices. Indeed, unemployment actually rises over time presumably reflecting the higher real wage generated by the assumption that wages react directly to faster money growth while other prices do not. Although these results should not be taken too seriously in themselves, they do illustrate an important caveat made in the introduction concerning suggestions for structural reform. Care must be taken in how changes are effected. If changes designed to speed up nominal price changes also have real (relative price) effects, then the ultimate effects on output and employment may be different from those originally envisaged.

SAM

SAM is an open-economy macroeconometric model with about 30 stochastic equations. Its important distinguishing features include full stock-flow accounting, articulated and forward-looking expectations, and consistent long-run equilibrium behaviour that in turn conditions expectations. In Rose, Selody and St-Gelais [W14], an explanation is provided of how rigidities are expressed in SAM and how the wage-price sector is constructed. Details of the simulations and the results are also provided. The shock under consideration is an unanticipated 5 percent reduction in the growth rate of the nominal money stock. In the long run this implies an equivalent reduction in the inflation rate in SAM, but mistaken expectations, the lagged adjustment of stocks (especially bond stocks), and deviations of prices from their long-run equilibrium values imply that the adjustment process is spread out over some years. The response of the “standard” model to this shock features a large (almost 6 percent) drop in output with an increase in the unemployment rate of almost 2.5 percentage points.³² These are temporary effects. The real variables are virtually back to control by year ten of the simulation. The inflation rate begins to fall quite rapidly and within three years has fallen by the full 5 percentage points. It then overshoots the equilibrium position³³ but subsequently cycles in. Real wages fall somewhat during this process and this decline contributes to the severity of the cycle via demand side effects. When real wages are prevented from declining, the cycle is considerably smaller, and inflation converges more rapidly to its steady state value.

A number of experiments were carried out using SAM to show the effects of reducing rigidities in the adjustment of wages and prices. As noted above in the summary of Paulin’s paper, SAM utilizes model-calculated equilibrium values for wages and prices in its adjustment equations. The implication of this is that any change that helps to keep prices and wages near equilibrium tends to be stabilizing for output and

employment in SAM. Indeed, when the basic equilibrating forces were strengthened in the simulations reported, the real effects of nominal shocks were smaller, and the price response itself was faster. In this sense, one can interpret the simulation results as showing the potential gain from reducing rigidities.

Perhaps of still greater practical significance is the demonstration from the simulation results reported that whether reducing rigidities helps or not depends very much on how such a change is interpreted (i.e., effected) in terms of altered model coefficients. For example, if reducing rigidities is interpreted to mean a larger response to the unemployment gap in the (real) wage equation, then any gains on more rapid price adjustment in the first few periods are offset by considerably larger and longer-lasting real effects later on. The authors explain that this arises in SAM because unemployment often reflects more than simply wages being too high. Indeed, except for the first few periods after a shock, the unemployment cycle reflects mainly the product demand cycle: the existence of unemployment indicates that demand is too low for overall equilibrium. Causing wages to fall relatively faster in such circumstances reduces product demand even further and creates greater real cycles which make unemployment worse. In effect, the aggregate demand effects more than offset the factor substitution effects. Rose, Selody and St-Gelais go on to consider rigidities in the form of expectations formation. In the standard SAM model, expectations are forward-looking. For inflation expectations, for example, SAM specifies that some weight is given to expectations about money growth and the implied long-run inflation rate. When forward-looking expectations in the price and wage equations are replaced with backward-looking or adaptive expectations, the result is a larger output cycle. If this is combined with a reduced coefficient on the equilibrium price gap term in the price equation, the cycle is larger still. The authors further note that the form of expectations formation matters to some degree even when basic market forces keep prices close to equilibrium. When those basic equilibrating forces are weak, the role of expectations becomes extremely important indeed.

At first glance, the message from these SAM results seems to be that, although making wages and prices more responsive to excess demand may or may not have desirable effects on reducing output cycles, policies leading to inflation expectations that better approximate equilibrium conditions are unambiguously useful. However the authors are careful to note that the role of expectations in SAM's wage and price dynamics may be interpreted to encompass more than expectations, if strictly interpreted. In particular, what is called expectations in the price formation process in SAM represents the underlying trends in price changes that exist independently of the influences of the various gap measures. This could be interpreted to include inertias from structural rigidities as well as pure expectations effects.

Conclusion

The “model-free” methodology employed in the second section of this study revealed certain interesting facts about the relationship between price movements and business cycles in Canada. Price increases clearly slow through recession, and there is no strong evidence that this is less so in recent years than earlier. On the contrary, there is some evidence of greater price flexibility recently though this finding does not control for the relative severity of recent recessions. The variability of relative price movements during recessions also appears to have been increasing over time. A consideration of sectorally disaggregated data indicates that regulated prices may be less cyclically variable than non-regulated prices and, in any event, have a greater tendency to lag output movements. The degree of domestic industrial concentration does not appear to have any significant effect on sectoral price flexibility, a result which may reflect the influence of foreign competition. Although the evidence is mixed, it does appear to confirm that prices in sectors exposed to foreign competition have a different relationship to domestic output fluctuations than do prices in “closed” sectors. Similar forms of analysis also confirm that productivity levels in Canada have a strong pro-cyclical character while real wages do not. Profits accordingly play a major role in adjusting factor income levels to output fluctuations over the cycle; profits move pro-cyclically as does the profit share of business output. Essentially the same point can be put in a different way using an accounting framework for price increases; changes in the general price level over the cycle owe more to changes in the price of labour services than labour’s share in factor incomes would warrant.

Our surveys of the evolution and current status of theory about the relationship between price movements and business cycles also proved enlightening. With respect to longer-run properties, macro-theory seems to have come full circle. Prewar classical theory implied that there was no long-run trade-off possible between inflation and output (employment). Although this view was strongly rejected for a time in the postwar period, the broad consensus currently seems again to be the classical one. Unemployment cannot be lowered permanently through acceptance of a higher rate of inflation. As to the nature of the short-run relationship between price movements and output cycles, a number of current schools of thought can be identified. The evidence from the literature seems to provide more support to the New Keynesian school than to that of the New Classicists. Keynesians suppose that output cycles will affect inflation but that a slow response of inflation can cause the output cycles to be bigger and longer than they would otherwise be. Keynesians further believe that prices do adjust slowly, in part at least because of institutional and structural characteristics in the economy. New Classicists see a rather different direction of causation with mis-

taken expectations about inflation causing output cycles. While the evidence favours on balance the Keynesian explanation of output cycles, there is an important element of truth in the New Classical position, and some convergence of views seems to be emerging.

Model-based empirical evidence on the relationship between cyclical fluctuations and prices indicates clearly that even nominal shocks (e.g., a reduction in the growth rate for the money supply) can have long-lasting effects on output and employment. This finding emerges from both reduced-form (small) models of the Canadian economy and from large structural models. Econometrically, it is very difficult to establish whether this occurs because institutional factors prevent prices from adjusting rapidly enough or because expectations of inflation are sticky or both. However, the evidence from the second part of our survey does imply that institutional factors play some role. Over time, all these models indicate that nominal shocks increasingly affect prices rather than output. Although the long-run accelerationist hypothesis is not everywhere confirmed, the non-accelerationist results generally seem to be due to the particular data period considered as well as the assumption in many models that certain prices are set exogenously.

We investigated the implications for the economy of greater price flexibility using two econometric models developed by the Bank of Canada, RDXF and SAM. Assuming counterfactually a steeper Phillips curve (faster response of wages to an unemployment gap) in RDXF in the face of a nominal shock resulted in a smaller output cycle than would otherwise have occurred. The basic lessons from SAM were of more general significance. The particular way in which prices are made less rigid has an important effect on the implication. This having been said, any development that causes inflationary expectations to adjust rapidly to nominal shocks helps reduce real output costs.

Notes

This study was completed in April 1984. Some data were revised as late as October 1984.

John Sargent's encouragement at all stages of this project was appreciated. In addition, we thank the two anonymous referees for commenting on this survey and on some of the Working Papers. We also acknowledge the special effort made by the authors of the Working Papers in the face of short deadlines and their ongoing responsibilities. Moreover, several of these authors undertook to read and comment in detail upon the other Working Papers and this survey. In particular, we thank David Rose, Jack Selody, and Pierre Duguay. We take responsibility for the content of the paper.

The Research Department of the Bank of Canada undertook the preparation of the study "Price Flexibility and Business Cycle Fluctuations in Canada: A Survey" for the Royal Commission on the Economic Union and Development Prospects for Canada. This paper was a working document for the study. The views expressed are those of the authors; no responsibility for them should be attributed to the Bank of Canada.

1. Background papers prepared for the Royal Commission on the Economic Union and Development Prospects for Canada, Public Information Division, Secretary's Department, Bank of Canada, Ottawa, Ontario. K1A 0G9.

2. Consideration is given in some papers prepared for this study to measures of the business cycle based on detrended output. Some attention has also been given to the inflation cycle itself.
3. These include the consumer price index, the gross national expenditure (GNE) deflator, the industry selling-price index, the wholesale price index and the deflator for final domestic demand, among a large number of other price series.
4. The particular CPI and ISPI series chosen were those consistently available over the longest time frame. Based on 1982 weights the set of CPI series selected comprise about 55 percent of the overall index. For the ISPI, coverage is 30.7 percent using 1961 weights and 20.7 percent using 1971 weights. Some discussion of the appropriateness of this methodology is found in Armstrong [W1].
5. At this point it is probably useful to recall the disclaimer at the beginning about examining the data in a model-free context. A number of researchers posit that business cycles were more a demand-side phenomenon in the pre-1970 period but a supply-side phenomenon in the 1970s. The implication of this is that the relative price changes may be the source of the cycle movements rather than demonstrating increased flexibility of prices to nominal demand shocks.
6. For example, consider a simple textbook model with an aggregate supply (*AS*) and aggregate demand (*AD*) schedule plotted with price and quantity on the vertical and horizontal axes. A downward shift in *AD* in such a model causes a larger drop in output if real wages subsequently rise (an upward sloping *AS* curve) than if real wages stay constant (a vertical *AS* curve).
7. See Freedman (1977) and Bank of Canada (1983). The relationship is rather more complicated than this in that changes in the international terms of trade and levels of indirect taxes must also be distributed among factor incomes.
8. In the early 1970s, concerns were expressed about a secular decline in profit margins in the North American economies. That trend can be observed clearly on Figure 3-7 for the postwar period but was dramatically reversed in the period 1973–74 by the commodity price boom and again in 1979–80.
9. The ways in which inflation affects measured profits are now well known. See Gilson (1983).
10. Jarrett investigated the implications for the trend coefficients of total labour and total capital income of splitting accrued farm and non-farm unincorporated business income into their labour and capital components and redefining total labour and total capital income appropriately. He found somewhat lower but significant trend coefficients.
11. See Jarrett [W9], p. 5, for further clarification.
12. See Stuber (1981). Real gross national expenditure per worker was virtually unchanged between 1974Q1 and 1981Q2 compared to average annual growth of about 2.3 percent between 1953Q2 and 1974Q1.
13. There are important qualifications even here. While most economists agree that changes in the level of the money stock have no real effects, there is much less agreement when it comes to changes in the rate of growth of the money supply. There is the well-known “Mundell-Tobin” effect, the relationship between price level and relative price variability, and the effects of a non-indexed taxation system. The Mundell-Tobin effect has to do with the effect of changes in the anticipated rate of inflation on real interest rates with subsequent effects on the level of investment (and hence real activity) and the capital stock. For some discussion of the latter two points and the inhibiting effects on output growth, see Jarrett and Selody (1982), Smith (1982) and Gilson (1983). All these points have to do with there being real costs associated with inflation.
14. Acceptance of the Radcliffe Committee Report’s rejection of the significance of money might have been behind some of these models. However, the presumption in all modern theories is that a sustained rise in money will expand nominal income.
15. See, for example, Frisch (1977).
16. The logic is that as the variability of absolute prices increases the less likely are people to interpret observed price changes in individual markets as relative price changes.

17. The existence of possibilities for improving performance does not, of course, demonstrate that there is adequate information to exploit them usefully.
18. The reader is referred to Makin (1982) for a discussion of how the relative size coefficients on the anticipated and unanticipated nominal terms can be used to test the rational expectations hypothesis when these measures are likely to be inexact. Mishkin (1983, chap. 6) also provides empirical evidence for the United States and discusses the relative size of the coefficients on anticipated and unanticipated nominal terms when long lags are used and the empirical measures are not precise.
19. Consider the following analysis. Inflationary expectations were rising until early 1981. Both consumers and businesses increased spending with the latter relying heavily on debt issues to finance long-term capital expenditures. Many three-year wage settlements were signed during this period granting high nominal rates of increase. When inflation began to fall below expectations in mid-1981, there was a sharp fall in output and many layoffs. The decline was exacerbated when firms had to honour the wage contracts signed earlier. Wage earners seemed unwilling to renegotiate, citing evidence of past inflation (much influenced by rising regulated prices), past real wage losses, and continuing concerns about a subsequent rebound of inflation. On the demand side, the previous overinvestment in new capital by many firms led to continuing declines in non-residential construction through the recession and even beyond.
20. According to the accelerationist hypothesis the maintenance of output above the trend level (or alternatively holding the unemployment rate below the "natural" rate) will lead to constantly increasing inflation.
21. Of particular importance is the possibility of a lack of independence between the error term (which effects p) and the nominal income term which will also effect p unless q adjusts appropriately.
22. The rise in the influence of lagged prices in Canada seems to indicate a growing trend towards adaptive as opposed to regressive inflationary expectations. Gordon found no change in the United States after a marked increase around the time of the Korean War.
23. The estimates for Canada of Coe and Holtham (1983) using post-1970 data indicate a very high parameter on the income term (0.8) and a lagged inflation effect of only 0.2. The accelerationist hypothesis is supported.
24. If prices are homogeneous in costs and all costs move proportionally to prices, then the nominal price level cannot be determined from the properties of the wage/price block alone. This block determines the real wage conditional on a given level of excess demand. The implication of this is that the long-run Phillips curve is vertical and that deviations of employment from full employment cause accelerating (or decelerating) inflation, assuming monetary validation.
25. See O'Reilly, Paulin and Smith (1983).
26. Paulin notes that this development implies increasing recognition of the theoretical constraints on the long-run level of prices arising from specification of any model's production technology.
27. Paulin also reports the case of a \$1-billion federal government non-wage shock sustained in real terms. Full details of these and other comparative model shocks are provided in O'Reilly, Paulin and Smith (1983).
28. In RDXF the discrepancy between income and expenditure is allocated to profits. As nominal income falls, this leads to a decline in both wages and profits.
29. In particular, these are comprised of parts of the transportation, communications, and financial services industries. It is worth noting in passing that the trend in these rapidly growing areas seems to be strongly toward less regulation in the United States.
30. Alternatively, the higher risk associated with larger price variability may be itself a cause of concentration.
31. This fact is not particularly surprising since Canada exports many raw materials whose prices are set in an auction-market context.
32. On p. 9 in the paper on the SAM model [W14] it is noted in footnote 10 that the magnitude of the responses may be overstated owing to a problem in the trade sector in the version used for these experiments.

33. This reflects the so-called "reentry" problem. A decline in money growth lowers inflation and nominal interest rates which increases the equilibrium demand for real balances. By *assumption* in these simulations, the authorities do not provide these extra balances.

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The following background papers are available by writing to:

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- W1 Armstrong, J. 1984. "Nonparametric Tests for Changes in the Cyclical Sensitivity of Prices."
- W2 Armstrong, J. 1984. "The Cyclical Sensitivity of Prices: The Cumulative Density Approach."
- W3 Aubry, J.-P., and K. Acheson. 1984. "The RDXF Response to a Monetary Shock Using Alternative Short-Run Slopes for the Phillips Curve."
- W4 Duguay, P. 1984. "Empirical Evidence on Price Determination in Canada."
- W5 Ferley, P., B. O'Reilly and A. Dunnigan. 1984. "The Post-1950 Cyclical Performance of Prices in Canada Part 1: A Data Exposition."
- W6 Ferley, P., and A. Dunnigan. 1984. "Recession Period Performance of Prices: 1914 to 1950."
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Indexation and the Adjustment to Inflation in Canada

PETER HOWITT

Introduction

Inflation, and uncertainty about inflation, have increased considerably over the past three decades. Canadians adjusted to this development in ways that helped to alleviate some of its ill effects, but these adjustments have been at best partial and imperfect, and in some cases have created problems of their own. Indexation constitutes a broad class of such adjustments, whereby the payments agreed to in labour contracts, debt contracts, government tax and expenditure programs, and other private agreements, are adjusted automatically when the price level changes (i.e., they are indexed to the price level), so as to reduce in real terms the variability of such payments. This paper examines the extent to which indexation and similar adjustments have been instituted in Canada, analyzes the economic effects of the practice of indexation, and discusses in general the question of which government policies on indexation are appropriate.

The first section describes the historical record of inflation and uncertainty about inflation. The next section describes the Canadian experience with indexation and other substitute arrangements. The following three sections do the same for debt indexation, pension indexation and indexation of government programs. The sixth section discusses the macroeconomic consequences of indexation. The seventh addresses a question that invariably comes up in policy discussions about indexation: why people have not adopted more indexation on their own initiative without any encouragement or coercion from the government. The penultimate section deals with some issues concerning the choice of price index, and the final section looks at some general principles that ought to apply to government indexation policy.

Inflation in Historical Perspective

The rise in inflation in Canada is recorded in Figure 4-1, which plots the annual rate of change of the Consumer Price Index (CPI) from 1921 until 1983, and of the Gross National Expenditure deflator (GNE deflator) from 1926 until 1983. These two measures of inflation have almost identical histories from 1926 on. Although there have been years (like 1974) when the difference between them was as much as four percentage points, it is usually much smaller. Large changes in one measure always coincide with large changes in the other. The coefficient of correlation between the two rates of inflation is .96. Because of this strong similarity, the description of inflation here will be confined to the CPI.

Figure 4-1 shows that inflation has been rising since the 1920s, with large fluctuations. It has been rising fairly steadily since the mid-1950s, going from less than zero in 1953 to over ten percent by 1982, but it fell dramatically in 1983.

There is a common view that high rates of inflation imply a high degree of uncertainty about the price level, which seems to be borne out by the movements in Figure 4-1 since 1953. The rise in inflation seems to have coincided with an increase in its variability.

If we consider the longer historical record, however, this coincidence does not occur. Inflation seems to have been considerably more variable over the period before the early 1950s than since, despite the lower average rate of inflation in the earlier period. More specifically, suppose we define the variability of inflation for each year starting in 1928 as its standard deviation over the preceding eight years around the sample mean for that interval. This moving standard deviation fell from an average value of 3.93 over the period 1928–55 to 1.84 between 1956 and 1983.

For economic purposes, price level uncertainty depends upon the variability of inflation, not around its average value but around the value

FIGURE 4-1 The Annual Rate of Change of the CPI (1921–83) and the GNE Deflator (1926–83)

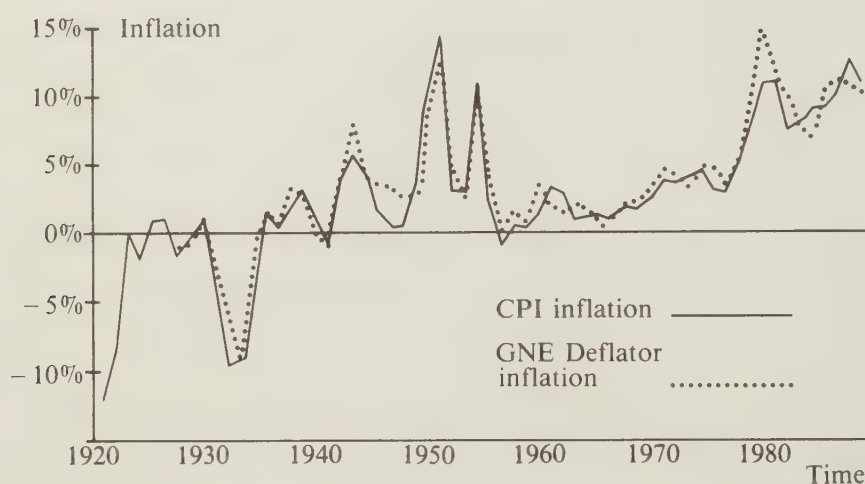
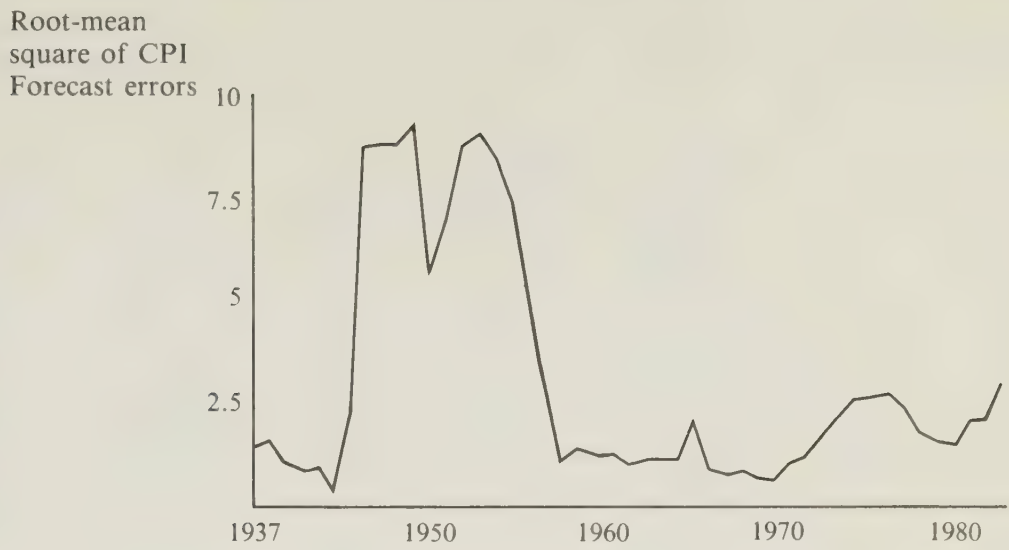


FIGURE 4-2 The Variability of Inflation (1937–1983)



that people were predicting; that is, upon the average size of forecast errors that people were making. There is no easy way to measure these forecast errors accurately, since no one can know what information or what formula people were using to forecast inflation. Figure 4-2 shows the results of one attempt at measurement. A forecast of inflation for each year starting in 1937 was made from an equation depending upon past values of inflation and monetary growth. Each year a new forecasting equation was estimated using data from a sample period ending the year before.¹ Figure 4-2 indicates for each year the root mean square of the forecast errors made by this procedure over the latest four years (e.g., for 1940, over the period 1937–40).

Although this is only one of many possible measures of uncertainty, it seems to bear out, as do various other measures,² the message of our earlier analysis; namely, that price level uncertainty has risen over the past ten or fifteen years but is still moderate by historical standards.

It should be noted, however, that these measures refer to forecasts one year ahead. For many purposes, what matters is the uncertainty attached to forecasting the price level many years ahead. Whether or not long-range uncertainty has followed the same pattern as one-year uncertainty is hard to tell, although Klein’s (1978) evidence for the United States suggests that it has.³

Wage Indexation and Substitutes

Wage indexation is primarily a means whereby firms and their workers mitigate the risks of price level uncertainty by reducing the extent to which unexpected changes in the price level can affect real wages. It thus helps in reducing the real income uncertainty faced by both sides of the wage bargain. It can also affect the variability of employment by reduc-

**TABLE 4-1 New Collective Bargaining Agreements,
Public and Private Sector,
Covering 500 or More Employees (Excluding Construction)**

	Contracts Without COLA			Contracts with COLA		
	No. of Contracts	No. of Employees Covered	Average Duration (Months)	No. of Contracts	No. of Employees Covered	Average Duration (Months)
1982	382	798,880	16.2	112	337,730	20.3
1981	344	593,270	19.7	138	285,330	26.8
1980	375	697,450	19.8	183	517,040	35.1
1979	411	707,850	19.5	154	415,915	34.6
1978	529	1,058,235	17.8	148	247,960	23.6
1977	454	834,145	14.7	123	208,265	20.6
1976	457	854,665	15.5	181	552,630	35.2
1975	275	444,780	16.8	140	312,270	28.1
1974	270	564,328	21.3	158	369,355	20.5
1973	305	531,820	23.4	79	145,980	33.3
1972	325	509,070	23.8	55	285,380	43.8
1971	324	598,115	25.3	36	64,645	34.0
1970	298	510,615	25.5	32	81,940	30.6
1969	332	661,295	23.0	27	137,590	34.0
1968	285	583,290	22.8	34	128,405	34.5
1967	215	358,575	25.9	12	36,880	35.7

Source: Department of Labour.

ing the variability of the real cost of hiring. This section examines the extent of wage indexation and related labour market adjustments in Canada, and briefly addresses the question of whether such adjustments have insulated labour markets from these direct effects of unexpected inflation.

Formal wage indexation takes the form of Cost of Living Allowance (COLA) clauses in wage agreements, whereby a basic wage schedule is adjusted periodically by an amount that depends upon the rise in the CPI. Table 4-1 indicates that the use of COLA clauses increased between 1967 and 1982. Most of the increase seems to have occurred between 1972 and 1976, a period during which both the actual rate of inflation and its uncertainty (as measured in Figure 4-2) also rose dramatically. The idea that the extent of wage indexation depends to a large degree upon the level and variability of inflation is also borne out by an examination of indexation in the 1950s. Cousineau and Lacroix (1977) estimated that the percentage of all contracts that were indexed fell from 21.4 percent in 1951 to only 4.3 percent in 1956, a period over which both inflation and its uncertainty (as measured by Figure 4-2) also fell sharply.

The data in Table 4-1 seem to suggest that roughly one-third to one-half of the Canadian labour force have indexed wages, but in fact, these data cover less than twenty percent of the labour force. Accurate data on the other eighty-plus percent with smaller bargaining units (including those

without collective bargaining) are hard to find. It is widely believed that those with smaller bargaining units have on average less formal contracts, of shorter duration, with a smaller degree of indexation. One piece of evidence bearing on the question consists of the multivariate cross-section regression of Cousineau and Lacroix (1977), which suggests that the size of bargaining unit has in itself an insignificant effect on the likelihood of indexation. However, this data base was also restricted to contracts covering 500 or more employees, and it is not clear whether the results can be extrapolated to smaller bargaining units.

Even those contracts with COLA may not provide 100 percent insulation of real wages from inflation. In many cases, the COLA clause provided for wage increases that were smaller in percentage terms than the price level increases that triggered them. Furthermore, a detailed study by Wilton (1980) of major private collective agreements signed between 1968 and 1975 revealed that (a) in 36 percent of the contracts a limit, or "cap" was put upon the wage increase that would be allowed no matter how high the rate of inflation, (b) in 27 percent of the contracts, some threshold amount of inflation was specified, below which the COLA clause would not be triggered, and (c) in 60 percent, the COLA provision did not cover the entire contract period.

Wilton estimated that, as a result of these restrictions, the percentage wage increases activated by the average COLA clause over the period studied amounted to only 47 percent of the inflation occurring over the duration of the contract. On this basis, it appears that indexation provides only modest protection against inflation — less than 50 percent protection for less than half the workers, and none for the rest.

Other adjustments may, however, have substituted for formal COLA protection. First, there is the phenomenon of increases in base wages negotiated in anticipation of future inflation.⁴ This is an imperfect substitute for COLA protection because it does not respond to unexpected inflation over the duration of the contract. Furthermore, the evidence cited below suggests that such increases are typically much less than the corresponding expected CPI increase on contracts without COLA. But they presumably occur even on contracts with COLA,⁵ which means that Wilton's estimate understates the extent to which such contracts protected real wages against inflation. This conclusion is corroborated by the finding of Cousineau and Lacroix (1981, p. 40, Table 7) that contracts with smaller elasticities of indexation tend to have bigger initial wage increases, which suggests that indexation and initial increases are alternative ways of accomplishing the same goal. It is further corroborated by Card's (1983) finding that on the average COLA contract, the *marginal* effect of an unanticipated one-point rise in inflation is to raise nominal wages by .83 of one percent. The difference between the marginal coefficient that Card estimated and the average coefficient calculated by Wilton is illustrated by the following example.

Suppose inflation was expected to be 7 percent and a base wage

increase of 7 percent was negotiated, along with a COLA clause to provide complete compensation for any inflation in excess of 7 percent. In other words, the clear intent of the contract was to keep the real wage constant. Suppose actual inflation turned out to be 14 percent and the COLA clause provided a further 7 percent wage increase. In this case, the contract provided 100 percent compensation for the 14 percent inflation, half in the form of base increase and half in COLA increase. This would be reflected in Card's coefficient, which would equal the 7 percent COLA increase divided by the 7 percent unexpected inflation, or 1.0. But it would not be reflected in Wilton's average coefficient which would equal the 7 percent COLA increase divided by the total 14 percent inflation, or 0.5. COLA clauses are just one means of inflation compensation, designed primarily to compensate only for the unexpected portion of inflation. Thus, Wilton's average coefficient, which divides by the total rate of inflation (whether expected or not) gives an overly pessimistic measure of their effectiveness, whereas Card's measure, which divides only by that portion of inflation for which the COLA clause is intended to compensate, gives a more accurate measure of their effectiveness.

Another adjustment has been the phenomenon of "catch-up" increases negotiated on new contracts, which correct wages for the effects of past inflation. These increases can substitute for indexation in two ways. First, by bringing wages up to where they would have been with indexation, they limit the effects of unanticipated inflation to the duration of the contract. Second, they may even go beyond this and compensate workers retroactively for their wage losses attributable to inflation over the previous contract period.

If there is an implicit understanding in labour markets that catch-up increases will work in the second of these senses to provide retroactive compensation, then in combination with anticipatory wage increases they may be very close substitutes for explicit indexation. That is, they may prevent inflation from affecting both the real well-being of the workers and the firms' real costs of hiring workers. The main drawbacks of this substitute form of indexation are that: (a) indexation provides wage adjustment sooner than do catch-up increases; (b) indexation covers even some employees who quit or who are permanently laid off during a contract period whereas catch-up increases are limited to continuing employees; and (c) indexation provides more certain protection than do catch-up increases that are subject to future negotiation.

Indeed, this implicit form of indexation may be preferable to formal COLA indexation as a means of adjusting nominal wages because it allows that adjustment to take into account not only the rate of inflation but also such variables as the relative demand for the firm's output, the productivity of the workers, and the state of the aggregate labour market. Economic reasoning suggests that the real wage struck in a labour

contract ought to be made contingent upon all those factors, but in many cases it may be less economical to devise and monitor an explicit formula taking all possible contingencies into account than to deal with them as a package in the next wage bargain. To single out inflation as the sole contingent factor to which wages will adjust automatically may make sense in bargaining situations where inflation is likely to be the most important factor. However, it makes less sense in situations where there is a strong likelihood that automatic adjustments for inflation would subsequently have to be amended, or even taken back, to compensate for these other factors.

The aggregate time-series evidence presented by Ridell and Smith (1982) and the disaggregated analysis of Christophides et al. (1980) suggest that catch-up wage increases do occur on non-COLA contracts, and they provide at least some ex post compensation, although exactly how much is hard to determine. More specifically, according to both studies, a one point rise in inflation during the current contract period, which had been fully expected at the beginning of the period would, if unemployment remained the same, be associated with an anticipatory increase of wages during this period of less than one percent, but the sum of that anticipatory increase and next period's catch-up response would be about 1.1 percent. In both cases, most of the 1.1 percent would take the form of catch-up.

A third adjustment has been the reduction in contract length. According to Table 4-1, the average duration of non-COLA contracts fell from 26 months in 1967 to 16 months in 1982. This development has substituted for indexation in two senses. First, it has allowed more frequent catch-up increases. Second, it has made anticipatory increases correspond more closely than they otherwise would have to actual inflation, because the price level is easier to predict over the near future than the more distant future. That this reduction occurred as a response to increased price level uncertainty is certainly plausible on a priori grounds of economic theory, as Gray (1978) has shown. This theory has also been supported by the empirical findings of Christophides and Wilton (1983).

The fact that reduced duration can substitute for indexation helps to explain not only why duration fell but also why duration is typically smaller on non-COLA than on COLA contracts (by an average of 10 months over 1967–82, according to Table 4-1). It also helps to explain why duration fell even on COLA contracts, since we have seen that these provide less than 100 percent real wage protection. Indeed, Table 4-1 indicates that duration fell more in percentage and in absolute terms on COLA than non-COLA contracts, a fact that cannot be explained so easily.

On the basis of this brief examination of the evidence, it is difficult to be precise about the extent to which these adjustments have substituted for indexation. But they appear to have been extensive. It is even possible to

argue that, to a first approximation, labour markets behaved as if wages had been fully indexed. The studies cited above on major collective bargaining agreements without COLA, show evidence that catch-up increases provided retroactive indexation. Card's evidence suggests that major agreements with COLA had on average a coefficient of indexation of .83. It is not unreasonable to suppose that the remaining .17 was typically made up with catch-up increases in the next round. Less is known about smaller bargaining agreements, but if they were typically of one year or less in duration, then they were *de facto* indexed, since COLA adjustments are rarely made more frequently than once a year.

There are three major qualifications to this very rough inference. First, there are the reasons cited above why the retroactive compensation offered by catch-up increases is an imperfect substitute for explicit indexation. Second, the reduction in contract length implies an increased frequency of contract renegotiation. These renegotiations can have large social costs; not only the direct cost of bargaining, but also the indirect costs of worsening the climate of labour relations by increasing the frequency with which workers and management are forced into a situation of direct conflict. Third, the extra delays imposed by catch-up adjustment, and the non-synchronization of collective bargaining agreements in Canada may have combined to make the dispersion of wages across the country rise more with inflation than if there had been more indexation, which may have affected the dynamics of aggregate wage adjustment.

It bears emphasizing that indexation is not a means of keeping every worker's wages constant in the face of inflation. As inflation changes, so do other factors relevant to the wage bargain. Indexation is, ideally, a means of allowing real wages to vary with those other factors in a way that is not directly affected by inflation. Thus, the large variation that Card found between industries in their coefficients of indexation probably reflects those other factors having been correlated differently with inflation in each industry. For example, when the relative demand for an industry's output is negatively correlated with inflation, one expects to find a coefficient of less than one. This is because an efficient risk-sharing arrangement would have both firms and workers apportioning the costs of a decline in demand by allowing both real profits and real wages to decline. Thus, to argue that real wages were *de facto* indexed is not to argue that any unwanted rigidity in real wages existed.

Indexation of Debt

Broadly speaking, inflation affects financial markets in two different ways. First, price level unpredictability causes uncertainty in the real rate of interest on conventional nominal debt contracts. Second, the expectation of inflation raises the cost of holding money and money

substitutes, even if there is little uncertainty. These two effects interact in complex ways, and their combined effect is to reduce the availability of liquidity to most business firms and households.

The concept of liquidity is important in what follows. Roughly speaking, it can be thought of as a measure of the ease with which an agent of given wealth can acquire the means of payment. It exists because of transaction costs, which make it easier to sell or borrow against some assets than others. An agent's demand for it is heightened by uncertainty about how much money he will want in the future. In the face of such uncertainty, liquidity adds flexibility to a person's portfolio.⁶

There is no commonly accepted, simple way of measuring the amount of liquidity in an economic system.⁷ For this reason, the concept has little operational value for the conduct of monetary policy. Despite these measurement problems, there is a long line of eminent monetary economists who have viewed the availability of liquidity as a prime factor in accounting for fluctuations in the level of economic activity. Furthermore, even if no single-valued measure of liquidity can be constructed, it is generally agreed that an agent's liquidity is enhanced by holding short-term rather than long-term assets, by borrowing on a long-term basis when the agent has long-term assets to be financed, and by maintaining low debt-service and debt-equity ratios or otherwise maintaining a good credit rating. It is also generally enhanced by anything that reduces the costs of financial intermediation.⁸

Debt indexation has often been proposed as a means of alleviating real rate uncertainty. A fully indexed debt contract (sometimes called a purchasing power contract or a real term contract) would specify automatic adjustments to nominal interest and principal amounts so as to keep their real values unaffected by inflation. This would allow the lender to avoid the risk of a lower than expected real return when inflation turned out to be more than expected. It would also allow the borrower to avoid the risk that inflation would be less than expected; i.e., that the real value of his debt will not fall as expected.

Likewise, debt indexation has been proposed as a means of alleviating one particular manifestation of the reduced availability of liquidity, known as the "tilt" problem. That is, a schedule of constant nominal payments, as specified in a conventional mortgage or instalment loan, or in the coupon payments on a bond, is a schedule of declining real payments when inflation is occurring. Suppose the rate of inflation rises, and the nominal rate of interest rises point-for-point so as to leave the real rate unchanged. This would increase the degree of tilt in the schedule of real payments. Both the nominal and real payments would rise initially, but the real value of the final payments would go down because of the compounding effect of inflation. Although in this hypothetical example the real rate of interest would be unaffected by inflation, the borrower might have difficulty coping with the increased initial pay-

ments. In effect, he would now have to repay his real indebtedness faster than before, even though the nominal duration of the debt contract remained unchanged.⁹

Indexed debt could alleviate this problem by specifying beforehand a constant schedule of real payments. Alternatively, it could specify an intentional tilt, but less than would be expected on a conventional contract. In either case, the lender's immediate claim upon the borrower's disposable income would be reduced, thus providing the borrower with more liquidity. Still another option would be to specify a fully indexed schedule with a degree of tilt that would be affected at least partially by the rate of inflation. In such a contract not all the inflation adjustment to the principal amount would be fully capitalized; some of it would have to be paid off in the form of higher nominal payments before the next scheduled adjustments. Increases in inflation would still reduce the borrower's liquidity, but not by as much as if he had renegotiated a conventional loan at the same expected real rate. Bossons (1982) presents a detailed description of how such variable-tilt, fully indexed mortgages could be designed.

Despite these putative advantages there has been virtually no debt indexation in Canada. There have been various other adjustments which in a sense have substituted for indexation, but, as we shall see, these have fallen far short of delivering the increased liquidity and freedom from inflation-risk that many advocates claim indexation could deliver.

One adjustment is the rise in the level of nominal interest rates that has accompanied the rise in inflation. This has been widely interpreted as a "Fisher effect" (named after Irving Fisher, 1896), whereby borrowers and lenders agree to a higher nominal rate to compensate for any expected inflation. In a world of perfectly neutral inflation, nominal rates would rise point-for-point with any increase in the expected rate of inflation, thereby leaving expected real rates of interest unaffected. This adjustment would protect lenders against expected inflation, although not against unexpected inflation.

There is a great deal of empirical evidence available on the Fisher effect, particularly in the United States. Although this evidence is quite mixed, most of it suggests that while some adjustment of nominal rates occurs, it is not enough to keep real rates unaffected. A one point increase in the rate of inflation seems to cause less than a one point long-run increase in, say, the nominal rate on treasury bills.¹⁰ Evidence on the effect on longer-term real rates is harder to obtain, because expected inflation is harder to measure over periods longer than one or two years. It is also hard to find evidence on the rate of return on equity, although what evidence there is seems to suggest that its real rate of return is also reduced by expected inflation.¹¹

Another important adjustment has been the shortening of the duration of debt contracts. This has occurred in two different ways. First, even if the nominal duration had remained the same, higher inflation would

**TABLE 4-2 Yearly Gross Canadian Dollar Bond Issues of
Non-Financial Private Corporations by Term-to-Maturity**

	0 to 5 Years Inclusive	Over 5 to 10 Years Inclusive	Over 10 years
	(percentage of total)		
1970	4.8	4.5	90.7
1971	1.6	13.9	84.5
1972	3.0	14.7	82.3
1973	2.1	2.9	95.0
1974	14.8	1.8	83.4
1975	7.8	5.4	86.8
1976	7.3	3.0	89.7
1977	3.9	19.8	76.3
1978	7.9	32.9	59.2
1979	13.1	7.1	79.7
1980	13.4	15.5	71.1
1981	9.0	32.1	58.9

Source: Bank of Canada, unpublished data.

have resulted in an automatic shortening of the real duration through the “tilt” effect. Second, there has been a shortening of the nominal duration itself.

This nominal shortening is evident in Table 4-2, which shows that of all new issues of Canadian dollar bonds by private non-financial corporations in Canada, the percentage having more than a 10-year maturity fell from 90.7 in 1970 to 58.9 in 1981. For U.S. dollar issues by the same group of firms, the figures were 98.1 in 1970 and 71.7 in 1981. These numbers underestimate the extent to which firms became increasingly dependent upon short-term finance over this period because they exclude short-term bank borrowing, which became more important relative to bonds.¹² Taking all sources of finance into account, the Bank of Montreal estimates that the ratio of long-term to short-term debt of the corporate sector has been decreasing since 1962, and fell sharply from 2.0 in 1978 to 1.2 in 1981.¹³

One of the most obvious instances of reduced duration has been in mortgages. In 1969, Canadian mortgage lenders began moving to the almost exclusive use of rollover instruments for home-owner mortgages. Such a mortgage is typically amortized over an initial period of 25 years, but has a rate which is renegotiable every five years or less. In effect, these are 5-year (or less) instruments rather than 25-year instruments. As inflation rose during the 1970s and into the 1980s the term on new and renewed mortgages became increasingly short. Table 4-3 shows how the duration of new National Housing Act approved mortgages for new housing fell, until by 1976 there were fewer than one percent with more than five years, and by 1982 only 18.8 percent with more than three years.

The fall in duration can be seen partly as a response to increasing price

TABLE 4-3 Initial Term on Loans Approved for New Housing Under the National Housing Act

	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
	(percentage)										
1	—	—	—	—	—	—	—	0.9	8.2	19.3	31.3
2	—	—	—	—	—	—	—	^a	0.9	3.6	3.3
3	—	—	—	—	—	—	—	14.0	15.2	19.6	46.6
4	—	—	—	—	—	—	—	0.1	0.3	^a	0.6
5	90.5	94.3	95.7	98.9	99.8	99.6	99.4	85.0	75.4	57.5	18.2
6 or more	9.5	5.7	4.3	1.1	0.2	0.4	0.6	^a	—	—	^a

Source: Canada Mortgage and Housing Corporation, *Canadian Housing Statistics* (Ottawa: CMHC, 1982), p. 73.

a. Denotes less than 0.1 percent.

level uncertainty, much like the fall in the duration of wage contracts. Because the price level is easier to predict over the relatively near future, shortening the duration helps to alleviate the real rate uncertainty faced by both sides of the contract.

The fall in duration can also be seen partly as a response to the increased cost of financial intermediation that is caused by high and uncertain inflation. This cost increases in at least three separate ways. First, intermediaries hold money and money substitutes either to satisfy legal reserve requirements or for precautionary reasons. Because there is little or no Fisher effect on many of these items, high inflation increases the cost of holding them. Second, uncertain inflation makes those costs uncertain. Third, and most important for present purposes, by increasing interest rate uncertainty, unpredictable inflation increases the risk that an intermediary will be caught in the sort of squeeze that brought so many U.S. savings and loan associations into financial troubles in the 1970s (Carron, 1982). Specifically, consider an intermediary that is fulfilling its traditional role of lending on a longer-term basis than it is borrowing. A rise in interest rates may raise its borrowing costs when it has to refinance its short-term debt, but will have a relatively delayed effect on the return to its assets, which are locked into the previous lower rates.¹⁴

One way of alleviating these higher costs is for the intermediary to be more cautious in its lending policy, and to require more stringent terms on its loans, thereby mitigating its exposure to risk. Another is to increase the extent to which the term structure of its assets matches that of its liabilities, thereby increasing the likelihood that if rates on some of its liabilities increase, then so will the rates on a corresponding set of assets, with offsetting effects on the intermediary's profits.

Thus the dramatic fall in the duration of the typical mortgage, for example, can be seen as partly reflecting the reduced duration of the term deposits on the other side of the intermediaries' balance sheets,¹⁵

and partly as a desire to mitigate the increased cost of intermediation that would have occurred even if the duration of term deposits had not fallen.¹⁶

Shortening the duration of debt has been a very imperfect substitute for indexation. Someone who borrows or lends on a short-term basis with a view to renegotiating the contract periodically is offered some inflation protection, because unexpected increases or decreases in inflation *tend* to cause compensating movements in short-term nominal interest rates. This helps especially to protect people against large, long-lasting fluctuations in inflation, which would cause considerable changes in the real value of long-term conventional debt instrument. But this risk reduction is limited by the fairly low correlation between interest rates and inflation.¹⁷ Furthermore, the necessity to renegotiate the debt more frequently reduces the liquidity of many borrowers.

A related development has been the move toward variable-rate debt instruments. In 1980, mortgage lenders began offering a variety of variable-rate mortgages on which the borrower agreed to automatic changes in the rate when market rates on new mortgages changed. These were quite popular when interest rates peaked in 1981 and 1982, although at mid-1984 they were relatively uncommon among new and renewed mortgages. There are very few examples of variable-rate bonds, although some chartered banks have issued preferred shares with a dividend tied to their own prime rate.¹⁸

The advantages of using variable-rate debt are similar to those of shortening the duration of debt. In the case of mortgages and bonds (and in the case of pension annuities), variable-rate debt can offer the borrower liquidity advantages similar to long-term conventional debt with the same real rate risk as on short-term conventional debt. Long-term variable-rate debt is, however, fairly uncommon, except in the case of pensions.

Partial versions of variable-rate debt exist in the form of a variety of instruments in which one side of the contract can renegotiate on demand. Thus, many new and renewed mortgages in the early 1980s were “open”; that is, the borrower had the option of repaying all or some of the debt at any time, with no charge. This would allow the borrower to take advantage of declines in the rate of interest without being exposed to risks of increases. Callable and extendable bonds have similar features, although the terms on which calls and extensions can be made are often quite limiting. In any event, these instruments typically reduce the risk of unexpected changes in inflation in one direction but not the other. For example, the lender on an open mortgage is not protected against the loss from unexpected increases in inflation, although the borrower will be partially protected against unexpected decreases. This is a much more limited form of risk avoidance than would be provided by a fully indexed mortgage or even a variable-rate mortgage.

One way of alleviating the “tilt” problem on mortgages is through the use of graduated payment mortgages (GPMs), on which nominal payments are not indexed but are set on a rising rather than a constant schedule. This reduces the tilt that inflation is expected to cause without mitigating any risks of unexpected changes in inflation. A GPM design has been approved by the Central (now Canada) Mortgage and Housing Corporation (CMHC, 1978), but its escalation provisions are fairly restrictive and its use has been limited mainly to large rental projects.¹⁹

Canadians have adjusted to the high cost of liquidity caused by inflation by finding ways to economize on the amount of non-interest-bearing cash held for transaction purposes. One example is the increased use of bank credit cards as a substitute for cash. Another, as Freedman (1983) has shown, is the introduction by deposit-taking financial intermediaries of daily interest chequing and savings accounts for households, and sweep accounts for large business firms. The extent to which these banking developments are a response to inflation and the extent to which they are independent manifestations of new developments in computer technology are open questions. The extent to which people have economized on non-interest-bearing balances is reflected in the fall in M1 (currency plus demand deposits) relative to M2 (M1 plus notice and personal term deposits). The ratio of M1 to M2 went from .39 in 1968 to .21 by 1983.²⁰

In summary, although adjustments of the financial system to inflation appear to have been very extensive, they have done relatively little to remove inflation risk from the system or to alleviate the liquidity problems that inflation causes. Indeed, many of the adjustments designed to mitigate inflation risk, such as the shortening of debt duration, have themselves added to the liquidity problems faced by borrowers. The major adjustments that have helped to alleviate the liquidity shortage are the financial ones discussed in the previous paragraph. But the overall effect of inflation seems to have been a major deterioration in liquidity. By 1983, the Canadian corporate sector was characterized by historically high debt-service ratios, debt equity ratios, and dependency upon short-term finance.²¹ The liquidity problems faced by home-owners and small business firms when interest rates rose in 1981 and 1982 were a major source of political unrest in Canada, and added to the social cost of the tight monetary policies that were being pursued to reduce inflation. While not all of these liquidity problems can be attributed to inflation, there is little doubt that it was the most important contributing factor.

Furthermore, although the adjustments may have gone some way toward mitigating the risks of unexpected future changes in inflation, they were too late to compensate for past changes. For example, the ex post real rate of return (including capital gains or losses) from holding Canada long-term bonds fell from 1.12 percent over 1953–66 to *minus*

**TABLE 4-4 Real Rates of Return on Long-Term Canada Bonds,
and Unexpected Inflation**

	Rate of Return	Unexpected Inflation
1965	-1.87	1.03
1966	-1.92	0.48
1967	-5.99	0.60
1968	-4.37	0.08
1969	-6.47	0.87
1970	19.67	-1.67
1971	5.98	-1.59
1972	-3.76	2.33
1973	-6.78	3.06
1974	-12.48	3.18
1975	-6.09	1.65
1976	11.99	-2.61
1977	-3.32	-1.55
1978	-6.56	-0.01
1979	-11.14	0.33
1980	-8.22	2.43

Source: James Pesando, *The Use of 'Excess' Pension Fund Earnings to Provide Inflation Protection for Private Pensions* (Toronto: Ontario Economic Council, 1983), p. 10.

2.68 percent over 1967–80 (Pesando, 1983, p. 10). Table 4-4 shows that from 1965 to 1980 the rate was negative in every year but three. It is likely that these negative returns were attributable to the fact that the rise in inflation over the interval was largely unexpected. This surmise is borne out by Table 4-4, which shows that the only three years of positive return were also three of the only four years when inflation was significantly less than would have been predicted by the forecasting method described in the first section, above.

The importance of this observation is its implication that, under Canada's present system of conventional nominal debt, it is unlikely that borrowers' liquidity can be restored quickly, merely by reducing the rate of inflation. For even though the actual rate of inflation is reduced, as long as there remains uncertainty about the future rate of inflation, borrowers and lenders will be unlikely to want to significantly increase the duration of conventional debt and thus expose themselves to the huge risks of interest-rate variability made evident by Table 4-4.²² And as long as the duration of debt is not significantly extended, there will not be a full restoration of borrowers' liquidity.

Pension Indexation

There has been some indexation within pension plans. In the public sector, indexed pensions are now the rule rather than the exception. Since 1973 there has been 100 percent indexation of federal public

service pension benefits. Many provinces also offer indexed pensions to their public servants.²³ In 1980, 9.6 percent of all public sector pension plans, covering 65.4 percent of members, had some formal indexation (Statistics Canada, 1982, p. 58).

Indexation of pensions is less widespread in the private sector, although inflation compensation is more common than it might appear at first glance. To begin with, most people covered by private sector pensions have a defined-benefit plan, under which the employer pays a specified annuity upon retirement. The main alternative to a defined-benefit plan is a money-purchase plan, under which the employee, upon retirement, receives from the fund into which his (and his employer's) contributions have been invested, its worth at the time; he is free to purchase any annuity he can afford with this fund. In 1980, only 4.7 percent of Canadian pension plan members had money-purchase plans (Statistics Canada, 1982, p. 34).

Most of these defined-benefit plans specify the benefit as a fraction of the employee's earnings, usually either in the last year or last several years of service, or the average over the period of service, or the maximum in any year of service. In all these cases, there is some degree of inflation compensation provided by the benefit formula because the earnings to which the benefit is tied are correlated with the price level. The degree of indexation is greatest in final-earnings and maximum-earnings plans.

There are also a significant number of employees under "flat-benefit" plans according to which the benefit is specified as a fixed number of dollars per year of service, to which no such quasi-automatic inflation compensation applies. There is every reason to believe, however, that continuing employees are in a position to bargain for increases in the size of that benefit in the light of realized inflation whenever contracts are renegotiated. And there is evidence that such adjustments do indeed take place.

The forms of inflation compensation that we have just been discussing are all made before retirement. Once a worker has retired, the benefits are no longer subject to these adjustments. Nor is there much formal indexation. In 1980, 98.3 percent of private sector pension plans, covering 95.1 percent of employees, provided no formal indexation of benefits (Statistics Canada, 1982, p. 58). Even in those cases where indexation clauses were provided, there was usually a cap of 2 or 3 percent upon the annual COLA increase.

There is, however, evidence that employers made ad hoc payments to retired employees, specifically in compensation for the effects of inflation upon the value of their non-indexed benefits. In 1977, a study by the actuarial consulting firm of Tomenson-Alexander Associates (1978) surveyed the practices of 149 out of the roughly 600 private pension plans in Canada with 500 or more active members, covering a total of 460,235 members. They concluded that while only 11 percent of the plans had

made automatic inflation adjustments to benefits, 68 percent had made ad hoc adjustments, and that these adjustments, both automatic and ad hoc, had averaged 66 percent of the increase in the CPI over the period studied: 1971–75. There is some reason for thinking that this provides an underestimate of the degree of ad hoc indexation, because the study excluded any adjustment to benefits for past service that had been negotiated through collective bargaining between the employer and existing employees and extended to retirees.

A similar study was conducted more recently by the Financial Executives Institute of Canada (1981), which surveyed 268 employer-sponsored pension plans covering 897,800 members. Of those surveyed, 76.6 percent reported having made some adjustment to retired persons' benefits during the previous fiscal year (usually 1980). Of the 293 reported adjustments, 191 were on an ad hoc basis and 21 were negotiated through collective bargaining; most of the rest were automatic. The study did not report the size of adjustments.

Thus, although there is little formal indexation of private pensions, these ad hoc adjustments may have been good substitutes for many pensioners. There are three qualifications to this tentative conclusion. First, the pensioners can no more count on these ad hoc adjustments than the wage earner can on catch-up wage adjustments. Indeed, unlike the worker who can at least count on being able to employ some bargaining power from the possible threat of withdrawing his services, the retired worker, or his survivor, is in a very weak bargaining position. All he can count on is the goodwill of his former employer and the employer's wish to maintain his reputation for fairness.

A second qualification is that the size of ad hoc adjustments appears to fall considerably short of full indexation. This may be accounted for partly by the fact that some of the inflation between 1971 and 1975 might have been anticipated in the form of earlier pre-retirement adjustments, but it seems unlikely that those could account for much of the shortfall, especially in view of the likelihood that much of the inflation over the period was unexpected, especially at the time when the average pensioner had negotiated his last pre-retirement adjustment.²⁴

The third qualification is that both reports strongly suggest that a significant proportion of all plans made no post-retirement adjustments at all. More data are needed to make a firm judgment about the exact extent of such non-indexation, but the evidence available leaves little doubt that a very large number of retired Canadians and their survivors had no substitute arrangement to protect their pensions from erosion by the unexpectedly high rise in inflation during the 1960s and 1970s.

Government Indexation

Most of the benefits of the federal government are indexed, including Old Age Security, Guaranteed Income Supplement, Family Allowance and

Veterans' Pensions. The Unemployment Insurance program also provides annual indexation of the maximum taxable earnings base and the maximum weekly benefit.

The Canada Pension Plan and the Quebec Pension Plan are both indexed. The Yearly Maximum Pensionable Earnings (YMPE), against which contributions are levied, is scheduled to rise up to and remain equal to the average industrial composite wage. The benefit is specified initially as a fraction of the average YMPE in the three-year period before retirement. So in this sense there is pre-retirement indexation as with private final earnings defined-benefit plans. There is also 100 percent indexation of the post-retirement benefit.

Federal and provincial minimum wages are not formally indexed. But the evidence suggests that frequent revisions have effectively substituted for indexation. In Ontario, for example, the minimum wage was increased eleven times between December 1965 and January 1979. The real value of this minimum wage in 1971 dollars per hour (using the GNE deflator) thus rose from \$1.21 in 1966 to \$1.50 in 1978, despite the 120 percent rise in the price level over the period.²⁵ Combined with the indexation of unemployment insurance and the Canada (Quebec) Pension Plan, it suggests that inflation has not been allowed to have a direct effect upon the supply of labour because of lack of government indexation.

Since 1974 there has also been substantial indexation of the personal income tax, in that the basic exemptions and brackets, and various other items, are automatically adjusted by 100 percent of the CPI increase each year.

These instances of government indexation have helped mitigate the real uncertainty faced by Canadians in their dealings with the federal government. But there is an important limitation to the ability of government indexation to reduce uncertainty. Specifically, future governments can always revise the laws. This possibility became a reality in 1982 when the government announced, as part of its restraint program, a cap of 6 and 5 percent, for the next two years respectively, to the indexation of tax brackets, exemptions, Family Allowances and Old Age Security.

More generally, the rate of personal income taxation can always be changed by Parliament. Because of this, indexation offers only a limited guarantee that tax rates will be unaffected by inflation. With indexation, a government that wishes to raise taxes will do so, and without indexation a government that wishes tax rates to be insulated from the effects of inflation can always periodically adjust the rates and brackets. For this reason, the broad measures of tax indexation that we have so far been reviewing have little to do with the overall level of taxation. At best, they can serve as an administrative convenience for achieving roughly the same tax rates that would otherwise have been achieved by other means.

While broad forms of indexation that pertain to the overall rate of taxation are thus of minor importance, more specific forms, especially

those related to the taxation of personal investment income and the corporate income tax — which affect the incidence of taxation upon different taxpayers and different economic activities — can be much more important. The rest of this section is devoted to discussing those more specific forms of indexation.

There has been some indexation of the taxation of personal investment income, and some substitute adjustments have been made to the personal income tax schedule. The first point to note is that interest and dividend income and capital gains constitute real income only to the extent that they exceed the real capital losses inflicted by inflation upon the holder of an asset; that is, only if the real rate of return is positive. For the most part, no allowance is made for this effect in the personal income tax system, which taxes nominal investment income the same, regardless of the rate of inflation, that is, regardless of the amount of *real* investment income. Indeed, a retired taxpayer whose income was generated largely by bonds or term deposits in the 1970s probably received negative real income, yet was taxed as if his real income had been five to ten percent of his nominal wealth each year.

The one exception is the recent decision to allow taxpayers to place their equity investment in Indexed Security Investment Plans (ISIPs). Only the real capital gains on an ISIP are taxable. This provision was proposed in 1982 and took effect late in 1983. At the time of writing, reports indicate that ISIPs are still not a common investment vehicle. They will probably become more popular as people become better informed about them and as banks and brokerage houses discover new ways to make them more attractive to their customers. But it is too early to tell how widespread they will become, especially in view of the fact that they do not offer the same tax deferral advantages of non-ISIP investments. It may take a resurgence of inflation before these deferral advantages are outweighed for many investors by the non-taxation of illusory gains on ISIPs.

Other features of the personal income tax can be regarded as at least partial substitutes for indexation; indeed, some were introduced explicitly for that reason. The \$1,000 exemption on investment income protects some small savers from the taxation of illusory nominal income. The fact that only 50 percent of capital gains are taxed reduces the incidence of taxation on illusory capital gains. The institution of RRSPs and RHOSPs, in combination with the indexation of tax brackets, insulates the return to saving in this form from any taxation of illusory gains.

The major vehicles of saving for most people are equity investment in owner-occupied housing and employer-sponsored pension plans. The latter is explicitly tax exempt and the capital gains and implicit rental income from owner-occupied housing are also tax free. Thus the lack of complete tax indexation does not have a major direct effect upon most savers. However, there are important effects of this non-indexation on

equity and efficiency. First, non-indexation has magnified the effect of inflation on the real incomes of those living on the returns to non-tax-sheltered investments, like the retired taxpayer described above.

A second effect of non-indexation has been to magnify the effect of price-level unpredictability on the real rate uncertainty faced by holders of non-sheltered investments, even if they are short-term or variable rate investments. It thus further limits the extent to which people can mitigate inflation risk by the kinds of adjustments described in the section above entitled "Indexation of Debt." Consider, for example, a taxpayer in a 50 percent bracket holding a savings account. Suppose the expected inflation rate rises by 10 points and the nominal rate on this account rises by 7 points through a Fisher effect. Then the real rate of return will fall not by 3 points but by 6.5 points (10 points inflation minus a 3.5 point increase in after-tax nominal income). To keep the real rate constant the nominal interest rate would have had to rise by 20 points. (Note that because of this effect, even a fully indexed debt contract would have a real after-tax rate of return that was negatively affected by inflation.)

A third effect of this non-indexation of taxes is to magnify a tax distortion in favour of equity investment in owner-occupied housing. This distortion would exist even without inflation because of the non-taxation of implicit rental income. Furthermore, such investment would be favoured by people when price-level uncertainty rises, even under an indexed tax system, because it provides a hedge against such uncertainty. But the distortion is increased even more by inflation under Canada's tax laws because a rise in inflation increases the taxation of illusory gains on alternative investments. The size of this effect may be considerably reduced if ISIPs become more widespread. It is also reduced by the fact that, for many people, access to owner-occupied housing is reduced by inflation because it lessens their ability to acquire the tilted conventional mortgage without which saving in this form is impossible. The last qualification is particularly important in Canada, where mortgage interest is not tax deductible.

Finally, it should be noted that there has been no indexation of the \$1,000 exemption on investment income which was introduced in 1974, or of the limits on RRSP contributions, which remained at unchanged nominal levels from 1976 through 1983. Their real values have therefore been falling, which has caused a reduction in people's ability to avoid the taxation of illusory gains. However, this situation will be reversed dramatically if and when the recently proposed increases in RRSP limits are enacted. Indeed, these new limits will make it possible for most savers to avoid taxation of personal investment income.

There is little indexation of the corporate tax system. There are three particularly important aspects of this non-indexation. The first is the tax deductibility of illusory interest costs. All nominal interest expenses are deductible, regardless of the rate of inflation.

The second aspect has to do with the evaluation of inventories. Under

the first-in–first-out system in effect in Canada, the cost of sales for tax purposes is measured by the nominal cost of inventories produced at some time in the past. The higher the rate of inflation, the more historical costs underestimate the true economic cost (i.e., the replacement cost) of selling goods.

The third aspect is the use of historical costs, rather than replacement costs, to calculate depreciation allowances. As with inventories, this underestimates the true economic cost of replacing the capital goods used up in current production, to an extent that rises with the rate of inflation.

When the expected rate of inflation rises, the first of the above aspects tends to reduce the effective rate of corporate income taxation. The second and third tend to increase it. The consensus among those who have examined the data is that the combined effect has been to increase the effective tax rate on most corporate income.

Various changes have been made to corporate income tax that have tended to offset this rise in effective rates. The most important of these changes include the accelerated depreciation introduced in 1972 on machinery and equipment in manufacturing and processing firms (Class 29 assets); the three percent inventory allowance introduced in 1977, which entitles firms to add three percent to beginning inventories each year, as a partial compensation for the difference between historical and replacement cost; the manufacturing and processing deduction introduced in 1973, which now amounts to a six percentage point deduction in the rate of taxation for such corporations; and the investment tax credit, the size of which varies from region to region.

A good case can be made that at the aggregate level of all corporations these changes in the corporate tax law have compensated for the effects of inflation on the after-tax cost of capital faced by the corporate sector. For example, Boadway, Bruce and Mintz (1984) estimate that this cost was equivalent to a 6.1 percent real rate of return from 1963 to 1971, and 6.0 percent over the much more inflationary period from 1972 to 1978. They estimate if there had been no inflation, the cost would have fallen from 5.6 percent to 5 percent, mainly because of the tax changes. Thus, the actual rise in inflation and the tax changes seem more or less to have nullified each other.

As we have already noted, indexation has no long-run effect on the average rate of taxation of broad classes of income. The impact of inflation on average effective rates can potentially be offset by variations in the statutory rate. Therefore, the results of Boadway, Bruce and Mintz may indicate nothing more than a relatively unchanged value of the effective overall tax rate intended by legislators. To the extent that much of the inflation between 1966 and 1978 was unexpected, however, the results may reflect a desired reduction in the effective rate, which was thwarted by inflation.

Although these tax changes may have offset the effects of inflation on the

TABLE 4-5 Estimated Cost of Capital, by Type of Capital

	Machinery	Buildings	Non-Depreciable Capital	Inventories	Overall
1963-71	5.0	6.3	5.9	8.4	6.1
1972-78	3.9	5.3	4.2	8.7	6.0

Source: Robin Boadway, Neil Bruce, and Jack Mintz, "Taxation, Inflation, and the Effective Marginal Tax Rate on Capital in Canada," *Canadian Journal of Economics* 17 (February 1984).

total cost of corporate investment, they cannot have offset many of the serious allocative effects that inflation has had through the corporate income tax. In particular, inflation has a much different impact on the after-tax cost of investing in different categories of capital, whereas many of the tax changes have not been aimed at those categories most adversely affected by inflation. As Table 4-5 shows, Boadway, Bruce and Mintz estimated that, despite the approximate constancy of the overall cost of capital, the cost of inventory investment rose, whereas the cost of other types fell between the two periods. Similarly, the effect of inflation on the tax treatment of investments that are financed with a relatively large proportion of debt, rather than equity, tends to be relatively favourable.

These allocative effects are important for at least four separate reasons. First, they may distort the type of investment made by any individual firm. For example, an increase in the expected rate of inflation tends artificially to make firms increase the proportion of investment in non-depreciable capital relative to inventories or depreciable capital, not for socially relevant economic reasons but merely to minimize taxes. Second, they tend artificially to increase the share of society's investment allocated to industries in which relatively tax-favoured investments are relatively more important. Third, they add to the uncertainty facing individual firms. Companies whose investments would be relatively favoured by the tax system if inflation were to rise would by the same token be relatively disadvantaged if inflation were to fall. Not knowing which is to happen, they face an unpredictable rate of effective taxation and hence an uncertain cost of capital. A completely indexed corporate tax system would remove this uncertainty but it cannot be eliminated under Canada's non-indexed system, even by the assurance that future modifications will be made to the overall rate of taxation, so as to offset the effects of inflation on the effective tax rate faced by the *average* corporation. Fourth, and finally, the favourable tax treatment of nominal interest costs will tend to induce all firms to finance an artificially large proportion of their investments with debt rather than with equity. This rise in debt-equity ratios can add to the liquidity problems faced by corporations during a period of high inflation.

A study by Bossons (1983a) sheds some light on the empirical importance of these allocative effects. Using published financial accounts of a

TABLE 4-6 Equivalent Excise Tax on Total New Investment Resulting from the Existing Corporate Income Tax

	Average Value of Tax	Mean Absolute Deviation from Average Value
5% inflation		
Extractive industries	11.0	3.0
Manufacturing	7.8	2.0
Distribution	10.9	2.3
Utilities, miscellaneous	18.1	4.2
All Firms	10.8	4.2
7.5% inflation		
Extractive industries	13.8	2.8
Manufacturing	11.4	2.1
Distribution	15.3	2.3
Utilities, miscellaneous	19.7	4.8
All Firms	13.8	3.8
10% inflation		
Extractive industries	16.3	2.9
Manufacturing	14.7	2.4
Distribution	19.5	2.5
Utilities, miscellaneous	20.9	4.7
All Firms	16.5	3.6
12.5% inflation		
Extractive industries	18.6	3.2
Manufacturing	18.0	3.0
Distribution	23.7	3.0
Utilities, miscellaneous	21.7	4.6
All Firms	19.1	3.7

Source: John Bossons, "The Effect of Inflation on Effective Corporate-Level Tax Rates on New Investment: Inter-Industry and Inter-Firm Variability" (1983). Toronto: University of Toronto, Department of Economics. Unpublished.

sample of 128 large non-financial Canadian corporations, Bossons estimated for each firm the average excise tax on new capital goods that would have the same impact on the effective marginal tax rate as the three inflation non-neutralities at hypothetical rates of inflation. Adding these distortions to those that would have been created in any event by the existence of a corporate tax system, Bossons calculated a total distortion for each firm, whose average value rises with the expected rate of inflation, and whose incidence is highly variable across firms, as is shown in Table 4-6.

These results support the conclusion that inflation risk is likely to increase the uncertainty faced by corporate investors under Canada's non-indexed tax system. An increase in inflation from 5 percent to 12.5 percent, even when anticipated, would cause the tax wedge to rise by much more for manufacturing firms (10.2 points) or distribution firms (12.8 points) than for utilities (3.6 points). Even if the overall tax rate

were adjusted to keep the average wedge constant across all firms, the tax on the first two classes of firms would rise, while that for utilities would fall. Thus the possibility that such a change in inflation might occur imposes real-rate uncertainty on the first two classes of firms, while the possibility of the analogous fall in inflation imposes real-rate uncertainty on utilities.

The evidence from column 2 of Table 4-6 suggests, however, that such changes in inflation would have little effect on the dispersion of tax distortions in the system. Distortions would rise for some firms and fall for others, but the distribution of distortions could be kept relatively constant by changes in the rate of corporate income tax.

The ability of corporate tax indexation to avoid the effects of inflation on real rates for individual firms would not fully apply to Canadian subsidiaries of foreign firms. Reductions in their Canadian tax liabilities resulting from indexation would reduce their foreign tax credits in their home country with little or no change in their total tax liability. By the same token, the application of indexation to such firms would require an unwanted transfer of tax revenue from the Canadian government to foreign governments. These effects might be avoidable if subsidies instead of tax cuts were used for foreign-owned firms (Fried, 1980, p. 12).

With this major reservation, it appears that lack of indexation of the corporate income tax has allowed the increase in price level uncertainty over the 1970s and early 1980s to translate into increased real-rate uncertainty faced by corporate investors.

It is hard to assess the quantitative importance of the effects of inflation and non-indexed corporate taxes upon debt-equity ratios. In particular, evidence on the "true" debt-equity ratio is difficult to obtain, because changes in inflation induce large discrepancies between historical book-values and market values. Taking these discrepancies into account, Bélanger and McIlveen (1980) estimated that the adjusted debt/equity ratio was about the same in 1978 as it had been in 1963. The rise in the book-value ratio for the entire corporate sector from 1.26 in 1978 to 1.52 in the third quarter of 1982 was too sharp to be accounted for plausibly by this discrepancy, but there were several factors other than inflation that could have accounted for the increase (Rousseau, 1983, pp. 38–39). Data concerning the flow of funds suggest a rising ratio of new debt to equity, but these data are also distorted by inflation because an increase in inflation requires an increase in the ratio in order to maintain a constant market-value ratio of accumulated debt to equity. Thus, whether the effect on corporate liquidity of non-indexation of the corporate tax has been empirically significant remains an open question. One possibility is that this effect was significant despite the true debt/equity ratio's failure to rise; that non-indexation discouraged firms from lowering the ratio and therefore avoiding some of the liquidity problems caused by the shorter duration of debt.

The final aspect of government indexation to be discussed in this section is indexation of government debt. Some economists recommend this as a means of reducing the real interest cost of the government debt, and stimulating private debt indexation by setting an example.²⁶ It has also been suggested as a way of allowing pension sponsors to offer indexed pensions without having to offer the very low rates or face the large risks that would be incurred if such pensions were financed with a portfolio of conventional bonds (Bossons, 1983b). Indexed debt has been issued by governments in other countries with moderate inflation (most notably in the United Kingdom) but not in Canada. How much this aspect of non-indexation has affected Canada is a question that cannot easily be determined without a full analysis of why private debt indexation and pension indexation is not more widespread. Accordingly, we shall postpone the question until the section on policy implications (the final section of this study).

Macroeconomic Implications of Indexation

As the economy adapts to inflation with indexation and other substitute arrangements, there will be macroeconomic effects over and above the effects upon risk and liquidity referred to above. This section discusses the effects of indexation on the average rate and variability of inflation and output. In each case it is important to keep separate the purely economic effects that would occur even with no change in policy, and the “political” effects, whereby the institution of indexation would induce changes in policy that affect macroeconomic performance.

There is a literature on the effects of wage indexation on the variability of inflation and output,²⁷ with the following implications. First, wage indexation could increase the variability of inflation, through the following mechanism. A random shock to the price level could trigger automatic wage increases, and this rise in the cost of providing goods could induce firms to raise their prices, thereby amplifying the initial movement in the price level. Similarly, if hiring decisions were always made on the basis of current real wages with no consideration of possible future catch-up negotiations, wage indexation would stabilize real output movements in the face of random shocks to aggregate demand. Decreases in aggregate demand would cause inflation to fall, but indexation would prevent real wages from rising and would therefore dissuade firms from reducing employment. By the same token, it would destabilize output in the face of real shocks to productivity or to Canada’s international terms of trade. Increases in the productivity of labour would cause the demand for labour to rise, and would not be dampened by the automatic rise in real wages that would occur without indexation when inflation fell.

Some serious reservations must be made about these conclusions.

First, there is the possibility (raised above) that an increase in explicit indexation would merely substitute for the implicit indexation of frequent catch-up increases, with no effect on the cost of hiring. Second, the destabilizing effect of indexation in the face of productivity shocks is attributable to the extreme assumption that wage agreements are not contingent upon such factors as productivity. Although such explicit contractual dependency is rare, the fact that a contract will be renegotiated in the future, at which time ex post adjustments can be made, allows for an implicit dependency, similar to the implicit indexation of catch-up increases. Third, the analysis assumes that output prices are flexible. Many economists — both Keynesian and monetarist — believe, on the contrary, that prices react weakly and slowly to changes in aggregate demand. According to the analysis of Barro and Grossman (1976), this contrary belief implies that aggregate-demand shocks impinge upon the demand for labour not by altering the real wage, as was assumed in the preceding analysis, but by raising the quantity of output that a firm can sell at existing prices. It implies, therefore, that wage indexation has little to do with the responsiveness of output to aggregate-demand shocks. Thus, even before we come to the “political” effects we must conclude that the effects of wage indexation on output- and inflation-stability are uncertain and possibly negligible.

It is generally agreed that wage indexation has no significant effect on the average value of output, which is determined primarily by the real factors of tastes, technology, endowments, international conditions, and the incentives created by government policies. There is a belief, expressed by such writers as Friedman (1974), that wage indexation can help reduce the long-run rate of inflation by minimizing the output cost of the tight monetary policies required to accomplish that goal. This belief is, however, a special case of the stability analysis to which we have attached serious reservations. Specifically, it assumes that when aggregate demand falls as a result of tight monetary policies, indexation will dampen the resulting effect on output and magnify the effect upon the rate of inflation. More generally, a variety of arguments can be brought to bear upon the question of how wage indexation affects the long-run rate of inflation, but they all seem to depend upon the same questionable stability analysis.

The macroeconomic effects of private debt indexation are not well understood. If it were imposed on people, it would make the typical bond a real asset rather than a nominal one. This would presumably make bonds more substitutable for real capital and less substitutable for money. If so, macroeconomic theory implies that it would make both output and prices more responsive to changes in the supply and demand for money and less responsive to changes in the demand for goods and services. But until we better understand why people have not adopted private debt indexation on their own, nothing can be said with confidence. This is a subject on which research is needed.

This leaves us with macroeconomic effects of government indexation. Since their effects seem generally to be similar, I shall examine simultaneously the effects of all forms of government indexation: taxes, spending programs, public pensions, and government debt. We shall see that government indexation appears to have a technical effect of destabilizing output and inflation, and even perhaps of causing ever-increasing government deficits. But these technical effects could be offset if the government made other changes in policy when adopting indexation. Furthermore, what little evidence there is suggests that these other changes would in fact be made. The average level of output should be raised by government indexation, but the effects on the level of inflation are hard to predict.

The key technical effects arise because government indexation tends to remove “automatic stabilizers” from the economic system. When the price level rises unexpectedly, the real amount of revenue raised by a non-indexed tax system tends to rise, because of “bracket creep,” the taxation of illusory gains on investment income, and the rise in effective rates of corporate income taxation. Moreover, the real values of non-indexed pensions and other benefits fall as does the real cost of servicing the public debt. All these automatic changes would tend to dampen the real amount of aggregate demand in the system, which would remove some of the upward pressure on the price level and thereby “stabilize” the initial rise. Indexation would remove this stabilizer, and would therefore tend to make the price level more variable.

The same technical effect tends to make output more variable as well. Unexpected increases in output tend to be accompanied by unexpected rises in the price level. Thus when output rises unexpectedly, the same automatic effects of a non-indexed system as described above would tend to reduce the real value of aggregate demand, thus dampening the increase in real output. Indexation removes this automatic stabilizer of output.²⁸

This last result must be qualified by noting that not all unexpected movements in output are accompanied by price level movements in the same direction. The oil shock of 1973–74 is a good counterexample. Most Western economies experienced a decrease in the overall level of real output simultaneously with a sudden increase in inflation. In such cases the technical effect of government indexation is still to destabilize the price level, but it might stabilize output, because it prevents the rise in the price level from causing an automatic decline in real aggregate demand which might cause further decreases in the level of real output. It is not clear, however, that such stabilizing effects are desirable. Supply shocks like this tend to lower the full-employment level of output, and require output to fall at least to some extent. Economists are divided on the question of how government policy should react to such shocks.

The same technical effects of indexation could destabilize the government budget deficit. To see how this works, consider the following

hypothetical example. In year 0 there is no deficit. Then a temporary random shortfall in government revenue causes a deficit of \$100 million in year 1. The government issues \$100 million of new bonds to finance the deficit, at an annual rate of interest of 10 percent. In year 2 the temporary shortfall in revenue is finished; tax revenues have risen to the previous level of government expenditures. But government expenditures have risen by the \$10 million interest payment that must be made on the newly issued bonds. This leaves a deficit of \$10 million in year 2, so to finance it the government issues \$10 million more of new bonds. But this makes the deficit rise in year 3 to \$11 million — \$10 million interest on the bonds issued in year 1 plus \$1 million on those issued in year 2. If this pattern keeps repeating itself, the deficit will rise to \$12.1 million in year 4, \$13.21 million in year 5, and so on without limit.

The deficit would be less likely to run away like this with a non-indexed government because the increase in government debt, especially if some of it were purchased by the Bank of Canada and thereby generated an increase in the supply of money, would cause the price level to rise, thus tending to reduce the deficit through the effects of the automatic stabilizers described above.

These destabilizing tendencies are often invoked as arguments against government indexation. But in assessing such claims, one must remember that the technical effect underlying all these instances of instability is something that potentially could be offset by appropriate changes in other government policies.

In the first two instances (inflation- and output-variability), a modified monetary policy could be used to offset the worst manifestations of potential instability. Consider, for example, a random increase in the price-level. If indexation caused this movement to cumulate, a tighter monetary policy could be used to resist it. In effect, this policy would substitute for the automatic tight fiscal policy that would otherwise have been induced by the price rise. Indeed, the monetary policy could just be the passive one of preventing the money supply from rising to add momentum to the price rise. Some price increase might still occur but as long as monetary policy did not react, the rise could not cumulate indefinitely.

By the same token, there is no reason why a government should let the deficit cumulate indefinitely without doing something about it. The overall level of taxes can eventually be raised to finance temporary shortfalls. The temporary 6 and 5 cap imposed by the federal government in 1982 was presumably an instance of this (although it was clearly only a partial solution). Such tax increases would partly substitute for the automatic increases that would otherwise occur.

Whether governments would in fact modify their policies by enough to prevent indexation from having a destabilizing effect cannot be determined a priori. There is one empirical study bearing on the question.

Fischer (1983c) examined the reactions of 40 countries to the 1973–74 oil crisis. He found that the change in the average annual rate of inflation from 1969–73 to 1973–74 was not significantly correlated across countries with the degree of indexation of wages, taxes, or debt. However, the change in the average annual rate of growth of the money supply between the two periods was negatively correlated with indexation. This suggests that indexation induces just enough extra assistance from monetary policy to nullify any technical effects on price instability. However, more research is needed before confident conclusions can be drawn.

None of this has any direct bearing on the question of whether indexation would lead to a higher average rate of inflation. If it destabilized inflation, it would cause downward movements as well as upward movements to be amplified. The effect on the average rate of inflation would depend on its effects upon the average rate of growth of the money supply, which is the major long-run determinant of inflation.

Whether indexation would lead to a more or less inflationary monetary policy is primarily a political question. It depends upon the combined reaction of the Bank of Canada and Parliament. Some insight can be gained by a fairly narrow economic analysis that recognizes inflation as a form of taxation, and supposes that the political process results in an average rate of inflation, such that the extra revenue that would be raised by a further increase in inflation would be offset by the extra political and economic costs of inflation.²⁹

Inflation generates tax revenues in at least four different ways. First, it forces people to save in order just to keep a constant real stock of currency on hand; for if they do not add to the nominal stock, inflation will cause the real stock to shrink. This saving releases resources that the government can purchase with the newly created money. Second, if the inflation is unanticipated it can impose a similar tax on the holders of the government debt. (Indeed, it can do this even if the inflation is anticipated, as long as there is less than a full Fisher effect.) Third, it can raise extra revenue through an unindexed tax system and, fourth, it can impose a tax on recipients of unindexed public pensions and other benefits.

The political and economic costs of inflation are harder to identify. They have to do with the arbitrary redistribution of wealth caused by inflation, the uncertainty created by any increase in inflation that raises its variability, the tax distortions that inflation magnifies, and the scarcity of liquidity caused by high rates of inflation.

From this point of view, indexation would tend to lower the average rate of inflation by reducing the revenue that can be raised that way. Of the four sources listed above, only the first would remain under indexation. However, it would tend to raise the average rate of inflation by reducing the cost, in so far as many of these costs, as we have seen, are aggravated by non-

indexation of the corporate tax and by the taxation of personal investment income. Furthermore, as Levhari (1983, p. 281) has remarked, reducing the revenue that can be raised by a given rate of inflation might have the effect of inducing the government to inflate even more rapidly in order to prevent its revenue from falling. In sum, there is no way of determining a priori the combined effects of these considerations.

Nor can the matter be settled easily by comparisons with other economies. It is often pointed out that countries with extensive indexation tend to have high inflation rates. This does not, however, imply that indexation causes inflation, any more than wet sidewalks cause rain. Just as likely is the inference that high inflation causes people to adopt indexation.

As for the average level of real output, it seems as if government indexation could potentially have a significant positive effect, although it is impossible to make confident quantitative predictions. As we have seen, tax indexation would probably reduce the uncertainty faced by savers and investors. It might also help to restore corporate liquidity. The example of indexed government debt, combined with tax indexation, might even encourage the successful issue of long-term private indexed debt by corporations. All of these effects might lead to an increased rate of capital accumulation. Furthermore, by reducing such large distortions as the current tax-favoured status of owner-occupied housing, indexation might increase the efficiency with which saving is allocated across different capital goods. The combination of greater efficiency and faster accumulation would lead to a long-term rise in the level of real output.

However, the magnitude of these output effects would depend on the sensitivity of saving and investment to changes in the real rate of interest and to changes in the uncertainty of real rates — all numbers about which there is a wide range of disagreement among economists. The empirical significance of the effect of tax indexation upon corporate liquidity, as we have seen, is not easy to assess. Nor is it easy to tell whether government indexation would lead to private debt indexation.

The Non-Indexation Puzzle

To many economists, the advantages of indexation are so obvious, and the disadvantages seemingly so minor, that the failure of indexation to have become adopted more widely is perplexing. Economists react in different ways to this problem. Some conclude that the market has failed, and propose government actions to encourage more indexation, or even the prohibition of certain kinds of non-indexed contracts. Others say that the advantages of indexation must be smaller than they seem, or the disadvantages greater; for otherwise, the people who are signing non-indexed contracts would have found it in their interest to adopt

indexation on their own. From the latter point of view, the failure of indexation to become more widely adopted is another illustration of how the invisible hand works in mysterious ways; government intervention to encourage or force more indexation would waste society's resources, appearances to the contrary notwithstanding.

While few would hold to either conclusion as a hard and fast rule, the distance between the conclusions illustrates the importance of trying to resolve the non-indexation puzzle. No argument in favour of subsidized or forced indexation will convince the majority of economists unless it identifies specific and plausible reasons why people have not correctly perceived or acted in their own self-interest when choosing the kind of contracts to sign. Likewise, no general argument against intervention will carry much weight in public discussion unless it identifies specific and plausible disadvantages that may have caused further indexation to fail the market test.

This section offers no resolution of the non-indexation puzzle. Its objective is the more limited one of defining the problem more specifically by citing three concrete examples of non-indexation, briefly noting the various answers that have been proposed in the literature, and offering some concluding observations that might be useful in evaluating government policy on indexation.

Before discussing concrete examples, we should make some preliminary observations. First, it will never be possible to achieve perfect indexation. Certainly, people's holdings of currency could not be fully indexed. To do so would be to fix the price level itself. While it may be technically feasible for monetary policy to fix the average price level over long periods of time, there is no known mechanism for fixing it on a month-to-month or even a year-to-year basis.³⁰

At a practical level, no asset of duration less than one month could be indexed either, because no price-level statistics are reported more often than once a month. Even month-to-month indexation cannot occur without a delay of at least three weeks — the reporting time lag of the Consumer Price Index.

While these logistical problems are perhaps of minor significance when it comes to the indexation of long-term debt, they are probably important enough to explain why many short-term financial contracts are not indexed. For contracts of a few months or less duration, the unpredictability of the price level probably introduces no less randomness into the real value of the contract than would be caused by applying indexation with a one- or two-month lag. Frequent adjustments also add to administrative costs.

Such problems become relatively less important the more unpredictable inflation becomes. But even in Brazil, for example, where inflation is far higher and more unpredictable than in Canada, issuers of private indexed debt make adjustments no more than quarterly (Simonsen,

1983, p. 128). It seems unlikely, therefore, that indexation of short-term debt would ever be practicable in Canada.

The second preliminary observation has to do with the argument that unfamiliarity with the principles and mechanics of indexation is what has inhibited its development; that people do not wish to take the first step into the unknown field of debt-indexation, even though they might be willing to follow anyone rash enough to take that first step if they were able to learn from the experience. This argument does not stand up well to empirical evidence. First, it is doubtful that Canadians would find indexed debt any more mysterious or complicated than they found variable-rate debt before it was introduced. Indexation of public sector pensions, the Canada Pension Plan and tax-brackets have been the subject of public debate for many years. Financial intermediaries are now familiar with the detailed mechanics of indexed debt after having been involved in discussions with, and represented, on the Lortie Committee on the federal government's proposal to subsidize indexed debt.³¹ Second, there is the evidence from the United Kingdom, where the government has been setting an example by issuing indexed bonds on a large scale for several years now, with no apparent difficulties, but as yet no private firm has followed suit.

The same observation applies to the argument that legal and regulatory problems are inhibiting indexed debt. The Lortie Committee found these problems to be fairly minor; probably no more severe than those encountered by issuers of variable-rate mortgages.

The third preliminary observation is that whether or not a person or a company would find that indexing a particular asset or liability reduces risk depends not upon the risk characteristics of that asset or liability itself but upon how it fits into the rest of the agent's portfolio. Many assets are quite risky in themselves, yet people pay a premium to acquire them because they provide a good hedge against other risks to which they are already exposed. This is why, for example, farmers who are already exposed to commodity-price fluctuations deal in commodity futures, or why companies who do a large volume of international trade deal in the forward market for foreign exchange. Most people would find it too risky to trade in these markets, but the farmer, for example, actually reduces his exposure to risk when he sells a futures contract. If the price of the commodity rises, then what he loses on the futures contract he gains on his crops. If the price falls, then the loss on the crops is offset by the gain on the contract.

The general principle of "hedging" illustrated by this example is that risk is reduced by acquiring assets whose returns are negatively correlated with one another. By the same token, risk is also reduced by acquiring assets and liabilities whose returns are positively correlated. The latter principle is illustrated by a phenomenon that we have already discussed; namely, the desire of financial intermediaries to acquire

assets and liabilities of matching term to maturity. Improving their match makes their returns more positively correlated.

These principles of hedging are crucial to any discussion of the non-indexation puzzle. For example, they imply that a person might prefer not to index a particular asset if that asset had been serving as a hedge against a non-indexed liability. Without this hedge, an unexpected fall in inflation would raise the real cost of the liability, with no offsetting rise in the real return on the indexed asset.

Let us turn now to some specific examples of non-indexation. The first is the combination studied by the Lortie Committee — indexed mortgages and indexed deposits. Why has no bank or other mortgage lending intermediary found it profitable to offer indexed mortgages, and to finance these by issuing indexed deposits? Many savers would find the indexed deposits an attractive asset. Home-owners would find that an indexed mortgage reduces their exposure to the risk of inflation, because with a non-indexed mortgage an unexpected reduction in inflation tends both to reduce the return to home-ownership and to increase the real cost of the mortgage. The intermediary might not want to index a mortgage if the non-indexed mortgage was serving as a hedge against a non-indexed liability. But this problem would be mitigated by indexing the deposits as well.

One reason why this innovation has not occurred is that it might offer little relief from the problem of tilt. Lenders are unwilling to allow a large part of the inflationary adjustment to be capitalized when that opens up the risk that the value of the borrower's house may fail to rise as fast as the value of the mortgage. However, Bossons (1982) has shown how indexation with less than 100 percent capitalization can make this problem no more severe than on standard variable-rate mortgages.

Many home-owners may prefer a big tilt to their mortgages because that facilitates rapid investment in the form of equity in their house — a form that is tax-favoured and that offers a hedge against inflation. But this does not explain why they do not prefer a fully indexed mortgage with no capitalization or with a large intentional tilt.

One important reason for non-indexation discussed in the report of the Lortie Committee is the difficulty an individual intermediary faces of keeping a close match between its indexed assets and liabilities so as to maintain a hedged position. Intermediaries would be less reluctant to enter the indexed market if there were, for example, indexed assets other than mortgages to invest in when there is an unforeseen reduction in the supply of credit-worthy borrowers in the mortgage market, or an unforeseen increase in the demand for indexed deposits. At the least, it seems that some wholesale market in which intermediaries could trade indexed debt would be necessary to encourage them to enter the market. They might also be encouraged to enter if the government were to issue indexed debt, which they could use as an alternative indexed investment.

The second example is the near absence of indexed private pensions. A large part of this is explained by the retroactive adjustments discussed in the section on pension indexation. The fact that those payments offered less than 100 percent ex post protection might also be accounted for by the pensioner's preference for a declining stream of payments to match his declining capacity to enjoy consumption expenditures. One problem with this explanation is that it seems far simpler for workers and their employers to negotiate fully and automatically indexed pensions with intentional tilt if this were the only difficulty. Furthermore, it leaves unexplained the large number of pensioners with no inflation adjustments, automatic or otherwise.

The hedging principles discussed earlier suggest other reasons for non-indexation of private pensions.³² Workers whose non-pension wealth is mostly in the form of housing, whose real rate of return is positively affected by inflation, may prefer to hedge this asset with a non-indexed pension whose return is negatively affected by inflation. Similarly, corporate pension sponsors whose profits are negatively affected by inflation may prefer to hedge these profits by a non-indexed pension liability.

Finally, there is the hedging problem that any underwriter of indexed pension annuities would have to face. To hedge the annuity most efficiently, given the existing range of securities in the marketplace, he would probably have to hold short-term money market instruments like treasury bills. Any other portfolio of financial assets would probably have a larger variance to its real yield, which would not be correlated with any corresponding variation in the real yield on the annuity liabilities. But the short-term portfolio would probably have a real yield of one percent or less per annum.³³ It is not clear that workers would want such a low expected return on their accumulated savings, even if it reduced the real uncertainty of their portfolio. This is especially true if indexed public pensions and other benefits already offer workers some protection against inflation.³⁴ This, too, is a reason for non-indexation that might be mitigated if the government were to issue indexed bonds which could be held by pension sponsors.³⁵

The final example of non-indexation is the failure of any non-financial corporation in Canada to issue an indexed bond. Again, various hedging reasons have been proposed. Most corporations appear to have real profits that are negatively correlated with inflation, and therefore have a hedging preference for non-indexed debt. But in the case of publicly traded securities like corporate bonds, it seems that there might be enough potential investors to whom indexation is sufficiently attractive that indexed bonds would sell at a premium.³⁶ The corporations would thus be paid to incur this extra risk. Furthermore, it is hard to believe that *all* non-financial corporations have returns that are negatively correlated with inflation. Utilities, in particular, seem to be likely candidates.³⁷

Even a firm whose returns are negatively correlated with movements in the overall price level might be able to reduce risk by indexing its bonds to a more specific index, like its own industry selling price index, that was positively correlated with its profits. Since industry-specific prices are more variable than broader price indices, this would add to the risks borne by the bond holders, who might not be willing to pay enough to make the issue worthwhile. But this begs the question of why an intermediary does not acquire a balanced portfolio of such bonds and so issue deposits indexed to a more stable overall price level. If it operated on a large enough scale, the intermediary could be well hedged, and risk could be reduced for the corporate borrowers and for depositors with a preference for indexed assets.³⁸

Likewise, to argue that corporations cannot find buyers for indexed bonds because all institutional investors have non-indexed liabilities, and small savers do not wish to hold bonds with such a thin market, is to beg the question of why someone does not mediate between these corporations and households by issuing indexed deposits for small savers.

Uncertainty about tax treatment might be an important reason for the non-issue of indexed corporate bonds. The Lortie Committee reported no ambiguities in the tax laws that pertain to the issuer of indexed debt. All nominal interest, whether paid in the form of dividend or capitalized in the form of an inflation adjustment, would be tax-deductible subject to the usual restrictions. But this interpretation has not been tested in the courts. Even if Revenue Canada gives a corporation a preliminary ruling to this effect, there is no assurance that the ruling will remain the same once the bond has been issued. If debt indexation became widespread, and people grew accustomed to treating the inflation adjustments correctly — as purely nominal adjustments that keep the real principle intact, rather than as interest — the laws themselves might be changed.

This survey of the non-indexation puzzle leads to no neat conclusions. Instead, I offer the following observations. First, many of the proposed explanations of the puzzle would no longer be valid, or at least would carry less force, if more government indexation were undertaken. Much of the negative correlation of corporate profits with inflation may be attributable to the non-indexation of the corporate income tax. The tax uncertainty that may be inhibiting the issue of corporate debt might be resolved by indexing the corporate income tax. The fact that the return to housing is positively correlated with inflation, which some have argued accounts in part for the non-indexation of private pensions, is due at least partly to the less than full indexation of the tax on personal investment income. The hedging problems that may be inhibiting intermediaries from entering the indexed debt market and discouraging the underwriting of indexed pension annuities might be reduced by issuing indexed government debt.

My second observation is that many of the explanations regarding

hedging are circular. For example, to explain the non-existence of indexed pensions by reference to the non-existence of indexed assets in which an underwriter could invest is merely to argue that non-indexation causes non-indexation. The same is true of the argument that intermediaries do not issue indexed mortgages and deposits because of the non-existence of alternative indexed assets. The arguments that corporations could not find willing buyers for their indexed debt are similarly circular.

If there is anything to be learned from these apparently specious arguments, it is that debt indexation may require a radical change in institutions. Invariably the non-indexation puzzle comes down to the question of why someone does not intermediate. In Canada's non-indexed financial system the typical intermediary finds it preferable to deal simultaneously with a large variety of debt instruments. Intermediaries' efficiency would be greatly impaired if they were restricted to only one kind of asset and one kind of liability. The same would probably be true of anyone wishing to intermediate in indexed debt.³⁹ Because of the principle of hedging, non-indexed instruments would generally not satisfy intermediaries' requirements for diversity without exposing them to the risk of inflation. Thus, to succeed, they might have to create many different kinds of indexed asset and liability, unless they could somehow count on others simultaneously to create the other markets.

This raises the possibility that debt indexation has not occurred because it necessarily involves too large and multifaceted an innovation for any single intermediary to organize without more collective coordination than the private economic system can achieve. Non-indexation, like money, may be an institution supported by nothing more than convention;⁴⁰ it persists only because everyone counts on everyone else counting on it to persist. Everyone might be just as willing to move to indexation if they could count on others doing the same.⁴¹

My third observation is that no explanation of the puzzle is believable if it predicts that private indexation will never occur. In fact it has occurred: in Brazil, Israel, and other countries.⁴² Whatever the obstacles to indexation, they would be overcome if inflation became enough of a problem.

My fourth and final observation is that non-indexation becomes less of a puzzle when one realizes that inflation, whether anticipated or unanticipated, is not an inherently neutral phenomenon whose real effects would go away if only we were clever enough to devise ways of avoiding its redistributive risks. It is a distorting tax on the holding of money, and indeed, on all transactions in a money-using economy.⁴³ Big changes in this tax tend to be associated with major changes in the size of government and in other taxes, and hence with a large variety of allocative inefficiencies. It was argued in the earlier section on indexation of debt, that even fully anticipated inflation seems to depress real rates of return on most assets. Perhaps some of this is attributable to the non-indexa-

tion of taxes, but in view of the large distortions associated with inflation, it would be surprising if it did not also occur to some extent even in an economy with indexed debt and taxes.⁴⁴

It is even arguable that inflation is a device whereby the political system redistributes wealth from old to young. If indexation were instituted, perhaps new redistributive taxes would evolve to replace inflation. Thus, one reason why the economic system has not provided assets free of inflation risk is that to a large extent the risk is non-diversifiable, and we all choose to bear some of it rather than pay the large market price (in the form of a lower expected real yield on our assets) of passing on our share of it to others.

Now, this argument may not, by itself, be enough to account for the non-indexation of pensions. The evidence from the U.K. suggests that long-term indexed debt would have a market yield of two or three percent real. This debt could be used by underwriters to hedge indexed annuities with a much higher yield than could be attained with assets available in Canada. But whether this would be high enough to make pensioners want indexed annuities is not clear.⁴⁵

However, the argument does suggest that it might be a mistake to count upon debt indexation, as some of its advocates do, to open up a large and active market in long-term, risk-free debt and thereby to stimulate long-term capital accumulation. For if inflation risk is real risk, then households would still respond to it by demanding shorter and more liquid assets in order to increase their flexibility.⁴⁶ The costs of intermediation would still rise with inflation for all the reasons discussed in the section on the indexation of debt, as well as because householders' increased demand for liquidity would raise the intermediaries' need for precautionary reserves, which typically would not be indexed.

Thus, even with debt indexation, all the reasons for the shortening of the structure of debt in Canada in the 1970s and 1980s, and for the other aspects of the deterioration of corporate liquidity, would continue to exist. It would thus be surprising to find long-term debt markets much more active than they have been.

The Choice of Price Index

In almost all the above⁴⁷ it was presumed that indexation would link payments to the Consumer Price Index (CPI). There are problems with this price index, however, and these problems have led to a number of suggestions for using alternative indices. The present section discusses these problems and makes certain suggestions.

The first thing to note is that, as Triplett (1983) has emphasized, there is no unique measure of the price level that is ideal for all purposes. It can be argued that in order to remove distortions from the tax system, we want a price level that in some sense measures the cost of living for the

typical household. For indexing private debt contracts, Jones (1980) has shown that the ideal price-index is one that shares inflation risks efficiently, and this is not necessarily, or even probably, a cost-of-living index. Finally, for the purpose of indexing the payments in a public pension system, some method whereby the recipients and beneficiaries can efficiently and equitably share the risks of a fluctuating level of national income is desirable (see, for example, Fischer, 1983b, and Merton, 1983).

The CPI is an approximation of a cost-of-living index, and for that reason it seems a good candidate for tax-indexation. However, there are well-known conceptual problems with the CPI. First, it may approximate the cost of living for the typical urban household, but not for others. Indeed, as the problems with the housing component of the CPI suggest, it may approximate the cost of living only for some average household that does not really exist.

The next problem is that because it measures the price of a fixed basket of goods (i.e., it is a Laspeyres Index) it tends to overstate inflation. For as the general level of prices rises, relative prices also change, and households find it advantageous to reallocate their expenditures accordingly, buying more of those items whose relative prices have fallen and less of those whose relative prices have risen. The CPI shows how much the cost of living would have risen for a household that made no such substitutions.

Another problem is that the CPI ignores the reduction in the cost of living brought about by the introduction of new goods and by the improvement in the quality of existing goods.

Perhaps the most important problem with the CPI has to do with its treatment of the cost of housing, particularly the part that measures the interest cost of owner-occupied housing. To measure this interest cost, the CPI uses a 60-month moving average of the prevailing mortgage interest rate, multiplied each month by a fraction of an index of current housing prices, where that fraction represents the typical home-owner's debt-value ratio. The procedure is supposed to reflect the cost to the average home-owner, on the assumption that home-owners all have five-year renewable mortgages with staggered renewal dates.

The problems with this way of measuring interest costs are first, that it treats all nominal interest as a real cost, regardless of the rate of inflation, despite the fact that much of that nominal interest cost is illusory. This tends to make the CPI overstate the rate of inflation when nominal interest rates are rising (and to understate it when rates are falling). Second, the assumption of universal five-year renewable mortgages is no longer realistic in the light of the maturity-shortening shown in Table 4-3. Thus, the 60-month average tends to move too slowly to reflect changing interest costs. Finally, the procedure ignores the implicit interest-opportunity cost of the typical home-owner's equity, because it measures only the explicit interest cost of the mortgage.

The last point concerning interest-opportunity costs is part of a more general problem. When real interest rates rise, the cost of living rises for someone intending to borrow, and falls for someone saving, say, for his retirement. The CPI ignores almost all such considerations by measuring only the costs of current goods and services. Its sole allowance for interest is in the cost of mortgage interest.

Despite these problems there are good reasons for thinking that the CPI is the only practical choice for the purpose of tax-indexation. This is because, first, most of these problems, or some variants thereof, are shared by all alternatives. Current-weighted (Paasche) indices, such as the GNE deflator, tend to understate inflation just as base-weighted ones tend to overstate it. No price index treats new goods and quality change satisfactorily.⁴⁸ The “rental-equivalent” method that has been suggested for avoiding the problems related to home-ownership has difficulties of its own. Specifically, as Darrough (1983) has explained, estimates differ greatly on how big the equivalent cost should be; there is also a conceptual problem of what we can infer about the cost of owning a house by observing the behaviour of rents on rental units when in fact the markets may be quite segmented between, say, different income groups. There are also problems of interpreting the real rise in the cost of rents when the rise in explicit rents is limited by rent-control legislation in several provinces. Finally, as Diewert (1983) has shown, there is no known way of dealing satisfactorily with intertemporal considerations.

Not only do other measures share the CPI’s problems, but as Hodgins (1983) has explained, some of them have severe shortcomings of their own.

The second reason for sticking with the CPI is that its behaviour does not seem to differ significantly from that of other similar measures, or of reconstructed versions of the CPI. This is reflected in Figure 4-1, for example, that shows the almost identical behaviour of the CPI and the GNE deflator. Hodgins (1983) has shown that roughly the same is true of the personal consumption expenditure component of the GNE deflator. Génèreux (1983) has presented evidence that the Laspeyres’ bias in the CPI is quite small. Hodgins (1983) also examined the behaviour of the Industry Selling Price Index and a productivity-adjusted measure of nominal wages. Neither of these is an approximation of a cost-of-living index. Furthermore, although they have approximately the same rate of change as other indices over long periods of time, both are highly volatile from quarter to quarter and year to year.

The third reason for sticking with the CPI is that it has many practical advantages. It is familiar, to the point that many Canadians probably think of it as *the* measure of inflation. As Hodgins (1983) argues, it also has a collection of other features not even closely approximated by other indices. Specifically, it is available monthly, with a time lag of less than three weeks, and it is never revised.

One important problem raised by these considerations is that the more we use the CPI for indexing government programs, the more political

pressure will tend to be applied to the process of computing the CPI and revising the basis for its measurement. Furthermore, politicians will be more highly motivated to suppress certain symptoms of inflation by means of price controls and other regulations designed to keep artificially low the prices of goods with a particularly large weight in the CPI. These sorts of problems have become evident in countries that have adopted widespread indexation, and although there is no reason for thinking that they have become serious in Canada yet, any move to further indexation probably ought to be accompanied by measures to strengthen the independence of Statistics Canada. It might also be worth considering means for revising the CPI to account for suppressed inflation in the event of direct price controls which would otherwise artificially lower its value.

When it comes to debt indexation, the choice of which index to use is more a private than a political question. As Jones (1980) has demonstrated, and as our above discussion of indexed corporate debt suggests, if indexed debt ever becomes popular, different people are likely to want to use different indices. Attempts to impose a common standard of deferred payment upon private agents are thus likely to be counterproductive. Instead, these considerations argue for having Statistics Canada make available as wide a variety of different indices and sub-indices for private use as possible.

Finally, we come to the political question of which index to use for public pension programs. The benefits of the CPP and OAS are currently indexed to the CPI. It has been argued that we ought to use instead a special version of the CPI, with expenditure weights that reflect the special expenditure patterns of the elderly rather than those of the typical urban household. However, the estimates constructed by Denton, Kliman, and Spencer (1981) suggest that this would not make a big enough difference to justify the change.

It has also been argued that perhaps these benefits ought better to be indexed to some measure of aggregate wages, so that productivity shocks that reduce national income can be shared more equitably between retired and current workers. The disadvantages of this scheme are that good wage data are hard to come by (the index number problems here are arguably even more severe than with the CPI), and that wages do not directly measure the cost of living against the risks of which indexation is supposed to insure the beneficiaries. One might also argue that the size of the benefit that society is willing to allow retired workers is something that will be decided when the workers have retired, regardless of the indexing formula. As long as current workers make up a political plurality over retired workers, a reduction in benefits can always be legislated.

Against this last point it can, however, be argued that a specific indexation formula for pension benefits is hard for the political process

to reverse, so that the indexation formula, while not offering a 100 percent guarantee against future revisions, does imply a fair measure of commitment. If so, then perhaps the scheme suggested by Merton (1983) is worth considering; it addresses the problem raised by those arguing for indexing benefits to wages. Specifically, Merton has argued that benefits be set at some fixed fraction of aggregate personal consumption. Similarly, a constant fraction of aggregate national income could be specified. The main advantage of these schemes over wage indexation is that they would cover situations in which wages rose while national income fell, or rose by less — situations that some fear might come about in the future as the baby-boom generation reaches retirement and the aggregate capital-labour ratio increases.

Policy Implications

The preceding section reached some tentative conclusions regarding the choice and construction of price indices. This section offers some additional conclusions, regarding desirable policy actions with respect to the categories of indexation discussed previously.

The first conclusion is that indexation should not be treated as a substitute for reducing inflation. Alleviating the distortions, the uncertainty, and the liquidity problems caused by inflation is a difficult task that requires stable anti-inflationary policies to be pursued for a long enough time so that people can begin to count on a more stable economic environment. Indexation can help in this task by mitigating some risks and reducing some distortions; by itself, however, it can do relatively little.

Our next conclusion is that the case for forcing or subsidizing private indexation seems weak. The only plausible element of market failure emerging from our discussion is the possibility that debt indexation may require too massive an institutional change for any private group of agents to organize. If this is true, then caution is needed. Government attempts to organize markets in the past have not, to say the least, been noticeably more successful than private attempts.⁴⁹

Furthermore, one of the reasons why private agents would find large-scale indexation difficult to organize is that they do not understand well enough the implications of such a big change, involving so many markets, to make the set-up cost worth paying. This lack of understanding will not go away by government fiat. It would be rash indeed to engineer large changes in institutions so little understood that we are unable to resolve the elementary indexation puzzle already discussed. We might lose more from impairing the workings of the financial system with ill-conceived attempts at reform than we can hope to gain from private indexation — especially under a regime of relatively moderate inflation.

The case for piecemeal imposition of private indexation is even

weaker than for large-scale intervention. Two parties to a voluntary contract cannot be made better off by being forced to adopt a form of contract that they do not want. If workers and their employers agree to non-indexed pension plans, then indexed plans must be inefficient from their point of view;⁵⁰ otherwise, they would have chosen indexed plans. If inflation turns out to be higher than expected, the retired worker may lose a voluntary gamble. This may be a reason for alleviating his poverty but not for overriding the wishes of others inclined to accept the same gamble. We might force or subsidize him and others to make privately inefficient choices if, by doing so, we could change the environment in such a way that the constraints under which choices are made more accurately reflect the true social opportunities. But this is not likely to happen when government intervention is limited to some narrow range of contracts. The narrower the range, the more likely it is that private agents will have already exploited any gains to be had from further modification of their contractual arrangements.

None of these arguments against government intervention into private indexing applies to further tax indexation or to the issue of indexed government debt. This study has identified several potential benefits from both types of change, although the size of these effects and their macroeconomic implications are difficult to judge.

The case for issuing indexed government debt seems quite strong. Such a policy might have the effect of fostering private indexation, and it could help many savers to protect themselves against inflation risk. Even if it had neither of these effects, nothing much would be lost, especially if it started on a small experimental scale.

The main arguments against issuing indexed government debt are that it might disrupt financial markets, that it might put us on the "slippery slope" to more inflation, and that it might encourage more government spending by making revenue easier to raise. The first argument is effectively countered by the U.K. experience. Similar predictions of disruption were made, but when the debt was issued, there were no noticeable effects of any sort on the market. Perhaps any potentially disruptive effects were offset by the implicit message that the government was betting on lower long-run inflation.

The second argument, as we have seen in the section on the macroeconomic implications of indexation, cannot be settled on a priori grounds. Nor is there an abundance of clear-cut evidence to consult. However, the same U.K. experience referred to above casts doubt upon this argument, too. Other than the implicit message of betting on lower inflation, the British government did not accompany the issue of indexing debt in 1975 with any credible announcement that anti-inflation policy was going to be pursued more vigorously.⁵¹ Despite the absence of any such preventive measures, there is no evidence that this issue started the U.K. on any such slippery slope.

The third argument against indexed government debt is the least credible, for it is based on the idea that anything that makes it harder for government to raise revenues is a good thing. By this argument, taxes should be chosen so as to maximize their obvious inequity and inefficiency.

More tax indexation is most likely to be worthwhile if it is introduced in a large-scale comprehensive manner, with careful attention to the interconnections between personal and corporate income taxes. This is because piecemeal schemes typically involve drawing an arbitrary line somewhere between those assets or taxpayers who are eligible for indexed tax treatment and those who are not, a line which invariably introduces new distortions and inequities.⁵² This means that any worthwhile move to more tax indexation is likely to have a large set-up cost, in the form of accounting difficulties that will have to be resolved, and the difficulties of phasing in the scheme with minimal disruption. Thus, the case for more tax indexation depends largely upon whether the benefits, which we have seen may be large but are hard to estimate, are worth the incurrence of this large set-up cost.

I offer no prediction about the ultimate outcome of this difficult cost-benefit calculation. But two points are worth making. The first is that large though these set-up costs might be, the task of tax reform should be assigned a higher priority than that of trying to bring about large-scale private indexation. The difficulties involved in the latter are even greater, and the benefits more doubtful. Also, if tax-indexation and indexed government debt have their maximum beneficial effect, they will bring about more private indexation on their own, whereas if they don't, this will tend to confirm the hypothesis that more private indexation has failed the market test for good reasons and should not be imposed.

The second point about tax indexation has to do with whether it will still be beneficial now that Canada has embarked upon the first-best policy of reducing inflation. In my opinion, the answer is yes. Further tax indexation would be just as worthwhile an undertaking now as it would have been two or three years ago when inflation was still over ten percent and apparently rising.

The reason for this belief is that most of the possible benefits identified in the preceding sections derive from the role of tax indexation in mitigating the risks of inflation. These may still persist to a large degree, even if we succeed in lowering the average rate of inflation. There will still be cyclical movements in prices that even the most stable monetary policy will be unable to correct. And there will probably always be the risk that future governments will be less committed to stable money. The historical record discussed in the first section does not offer unambiguous support for the idea that reducing the average rate of inflation would lower its uncertainty.

Indexation might then play a useful safeguard role even if Canada moves, as we seem now to be doing, to a less inflationary environment.

Indeed, it will be most useful during the transition, when uncertainty is heightened by the doubts that many people must have about whether the move to lower inflation is permanent or temporary. This uncertainty will probably persist for many years.

Furthermore, the time to introduce a large and important change like government indexation is when the public mood is conducive to thoughtful and rational deliberation, not when inflation has generated an atmosphere of crisis, in which hasty decisions may be made and transient objectives may intrude.

Notes

This study was completed in August 1984.

The author is grateful to Joel Fried, John Grant, David Laidler and Ron Wirick for their helpful suggestions and detailed comments on earlier drafts, to Michael Parkin for providing useful references, and to John Sargent for help at all stages of the project . . . even though their advice was not always heeded. George Stadler provided excellent technical assistance.

1. For each forecast, first the equation $\pi_t = \alpha_0 + \sum_{i=1}^4 \alpha_i \pi_{t-i} + \sum_{i=1}^4 \beta_i \mu_{t-i}$ was estimated,

where π_t denotes inflation in year t , and μ_t the rate of growth of M1 in year t ; then the same equation was re-estimated, restricting to zero the coefficients that in the first estimation had been statistically insignificant. Each equation for 1937 through 1950 was estimated by using a sample period consisting of all past years. From 1951 on, the previous 30 years were used. Thus, from the mid-1950s through 1983, all the data in Figure 4-2 refer to forecasts from equations estimated with the same degrees of freedom. For earlier periods, the degrees of freedom rose over time which, if the equation being estimated had been stationary, should have had the effect of reducing the root mean-square forecast error over time.

2. See, for example, Christophides and Wilton (1983). For similar results, using U.S. data, see Taylor (1981) or Fischer (1982).
3. Klein (1978) has argued that the death of the gold standard in the 1920s removed an anchor to long-term price expectations, thereby increasing long-run price level uncertainty. This could conceivably be consistent with a decrease in short-run uncertainty if there was no longer an expectation that several years of inflation would lead to gold outflows, eventually bringing the price level back to its equilibrium value.

This argument may well apply to a comparison between the relatively stable pre-World War I gold standard era and the period since 1920. But from the 1920s, the gold standard was either dead or in obviously precarious health. Klein's measure of long-term price level uncertainty for the United States, which had about the same value in 1975 as in 1885, nevertheless fell dramatically from the mid-1920s to the mid-1970s with a noticeable upward trend from 1968-75, a pattern that appears roughly consistent with our discussion of one-year uncertainty.

4. This phenomenon is the essence of the natural-rate-of-unemployment theories developed by Phelps (1967) and Friedman (1968).
5. I have not found any empirical studies of this effect on COLA contracts, except for the indirect evidence in Card (1983) referred to below.
6. The connections between liquidity, flexibility and uncertainty have been developed by such writers as Hart (1942), Marschak (1949), Goldman (1974), and Jones and Ostroy (1984).
7. Benjamin Friedman's (1983) attempt to measure liquidity in terms of total debt outstanding has not been greeted with much approval by other economists.

8. Bernanke (1983) has proposed several measures of this cost in his interesting attempt to show that the rise in the cost of intermediation in the United States in the early 1930s was an additional factor to the reduction in the total stock of money which accounted for the severity of the Great Depression.
9. In principle, the borrower could offset this tilt by borrowing even more initially, on a short-term basis, using the proceeds to help finance the increased mortgage payments, and waiting until the reduced real value of the mortgage payments provides him with the real disposable income to repay the short-term debt. However, the ability to offset in this manner is constrained by various imperfections in capital markets that would prevent the borrower from undertaking such short-term borrowing at a rate of interest as low as the mortgage rate. It is also constrained by the widespread use of conventional debt-service ratios, which might make lending institutions unwilling to lend more to the home-owner now that the fraction of his income taken up by nominal mortgage payments has increased, despite the fact that the real values of his assets, liabilities and income have not changed.
10. For references to some of the evidence, see Fried and Howitt (1983).
11. See, for example, the simple regression equations contained in Fama (1981), or the results surveyed in Chapter 3 of Pesando (1977).
12. In 1982, of all outstanding loans by chartered banks to non-financial corporations and unincorporated businesses under authorized limits of \$200 thousand or more, about 60 percent were demand loans. (*Bank of Canada Review*, November 1983, Table 11, p. S46.) Thus, bank lending in recent years has tended to be short-term. In the absence of readily available figures for earlier years, it is hard to tell whether bank lending has become more short-term, although it would be anomalous if this had not been the case.
13. See Canada (1982a, p. 74).
14. That the cost of intermediation has increased because of the rise in inflation might seem to be contradicted by the fact that financial intermediation has been a sector of very rapid growth over the period of rising inflation. This apparent contradiction can be explained by the fact that inflation has raised not only the cost of intermediation but also the demand to hold the relatively liquid liabilities of financial intermediation. Thus, it could be that the demand curve for such liabilities has shifted even more rapidly than the supply curve. See Fried and Howitt (1983, Figure 1).
15. By 1981, of all the increase in personal fixed-term deposits at banks plus certificates and debentures at trust and mortgage loan companies, over 85 percent were for less than one-year terms. See *Bank of Canada Review*, May 1982, p. 11.
16. Thus, for example, the move to 5-year mortgages and less would have helped Canadian lending institutions to avoid the fate of the U.S. thrift institutions, even if the duration of their liabilities had remained unchanged, since these liabilities were initially of much shorter duration than the typical mortgage.
17. See, for example, the calculations of Pesando (1983).
18. One such issue was described in the *Financial Post* (1983), "B of M Enters Fray to Raise \$200 million," December 24, 1983, p. 5.
19. For a critical assessment of the CMHC's Graduated Payment Mortgages, see Kesselman (1981).
20. Not all of this decline can be attributed to inflation. About half of it can be explained by the fact that the demand for M2 has been raised more than M1 by the increase in real incomes between 1968 and 1973. The rise in income over the period was about 63 percent. According to Cameron (1979), the difference in income elasticities between M1 and M2 is approximately .35. Thus, the rise in income itself made the M1/M2 ratio fall by about $(.35 \times 63 =)$ 22 percent, or from .39 to .30, which amounts to half the observed fall.
21. For details of these measures of liquidity, see Rousseau (1983).
22. The standard deviation of this real rate increased from 5.32 during the period between 1953 and 1966 to 8.71 between 1967 and 1980.
23. For more details, see Myers (1978, especially p. 107).
24. The average rate of inflation between 1971 and 1975 was 7.38, and the average one-year

forecast error, according to Table 4-4, was 1.73. The average relevant forecast error was undoubtedly much larger.

25. These data are described by Parkin (1982, pp. 179–80).
26. See the various papers in Conklin (1982).
27. See, for example, Gray (1976) or Fischer (1977).
28. An interesting initial attempt to estimate the size of the technical destabilizing effect of tax-bracket indexation in the U.S. economy is reported by Zilberfarb (1981).
29. The framework is that of Barro (1983), who makes a sharper distinction between expected and unexpected inflation than is made in this analysis.
30. Even commodity-money systems do not guarantee cost-of-living stability because, for practical purposes, the commodity standard must be a much narrower bundle than the one evaluated by the CPI. As Hall (1982) has recently argued, some version of Irving Fisher's proposal to systematically redefine the commodity value of the monetary unit so as to stabilize its purchasing power might be attempted, but the problems faced by such a scheme would not be much different from those faced by anti-inflationary monetary policy under Canada's present monetary system.
31. Canada (1982b).
32. These reasons have been elaborated by Summers (1983).
33. See Pesando (1983) for the relevant calculations.
34. This argument has been made by Feldstein (1983) for the U.S., where it is presumably even more relevant than Canada because of the large size of social security benefits compared to CPP and Old Age Security benefits in Canada.
35. This argument has been made forcefully by Bossons (1983b).
36. This is the implication of Fischer's (1975) theoretical analysis of the demand for indexed bonds.
37. Fischer (1983a) found that real profits of six U.S. corporations, out of a sample of sixteen, were positively correlated with random fluctuations in the price level. He defined real profits by correcting for nominal debt costs, but not for historical cost depreciation or inventory evaluation. The failure to correct for the latter two factors may have introduced a spurious positive correlation, since these factors tend to overstate profits as the price level rises. The empirical question of how large a percentage of corporations have real profits positively correlated with inflation is therefore an open one.
38. Blinder (1977) has suggested that the U.S. government create such a National Inflation Mutual Fund.
39. One example of the need for variety is given by Bossons (1983b), who points out that sponsors of indexed pensions would be unable to hedge to their accustomed degree if there was not a large variety of maturities of indexed debt to invest in.
40. Indeed, in the case of short-term debt, our earlier examination of the non-feasibility of complete indexation suggests that money and non-indexation are simply different manifestations of the same convention.
41. This argument is formalized in Howitt (1981) to explain why people do not index prices to the variables that determine the quantity of money in the system and thereby neutralize the effects of predictable changes in the quantity of money.
42. See Bhatia (1974) for a useful survey of international experience.
43. For an elaboration of the idea of inflation as a tax on transactions, see Leach (1983).
44. This point was made by Parkin (1977) in his critique of Blinder's National Inflation Mutual Fund proposal.
45. The fact that indexed pensions have not followed the issue of indexed government debt in the United Kingdom may be attributable to the lack of sufficient variety in maturities (see note 39).
46. That people respond this way to inflation is an important component of Leijonhufvud's (1981) insightful analysis of inflation.
47. The one exception was our scrutiny of the possibility that firms might issue debt indexed to their own industry selling price.

48. For a discussion of how these issues might be dealt with by econometric techniques, see Berndt (1983).
49. Indeed, there is something perverse about the government forcing people to take out insurance against the consequences of its own actions.
50. There is an argument that this outcome may be privately efficient but not socially because the outcome of the agreement will be biased in favour of non-indexation by the existence of means-tested public support programs like the Guaranteed Income Supplement (GIS). I doubt that this particular bias is empirically significant. In any event, it is not clear whether the bias implies a case for forced indexation or for modification of GIS.
51. The issue was well before the advent of Thatcher. In any event, as Sargent (1983) has argued, her announcement of tough anti-inflation policies was hardly a credible one.
52. This seems to have been the case even with the carefully thought-out scheme considered by the Lortie Committee. See Conklin (1982).

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International Monetary Economics in Theory and Practice

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Introduction

In the history of monetary economics, questions of practical economic policy have been the single most important impetus to research, even apparently purely theoretical research. The economic well-being that the monetary system has so much to do with promoting is a legitimate matter of political concern, and in the modern world, the institutions whereby that concern is expressed and dealt with are overwhelmingly national in character. International institutions do exist, but their main role is to disseminate information and provide forums for discussion, not to exercise political power. Political power resides at the level of the nation state, and it should therefore not be surprising that a body of analysis designed to deal with policy issues views the world principally from the vantage point of the policy makers of the nation state. Though some contributors to International Monetary Economics, e.g., Robert Mundell (1971) and John Floyd (1985) have concerned themselves with the functioning of the world economy as an entity in its own right, the bulk of the literature that I shall survey here is written from the former viewpoint.

Policy prescriptions must, of course, be based in part on political judgments but, if policy prescriptions are to be viable, they need a sound analytic foundation. My principal aim in this paper is not so much to derive detailed policy prescriptions for the monetary aspects of Canada's international economic relations, as to set out the economic considerations that must be taken into account in arriving at such prescriptions. I shall certainly have much to say about policy and about the choice of exchange rate regimes in particular. I shall therefore find it

impossible to avoid making political judgments. However, in what follows, I shall stress what economic theory and historical experience suggest is and is not economically viable rather than get involved in a detailed discussion of the implementation of specific policy measures.

My analysis will be limited in one other important respect. I shall discuss international monetary matters principally as they impinge upon so-called market economies. In practice, that means economies with more or less freely convertible currencies whose international economic relations involve to a significant extent the decentralized activities of individuals and privately owned firms. What follows is thus mainly relevant to the international economic relations of advanced Western economies and perhaps relevant to the international economic relations of the rapidly developing market economies of Southeast Asia. There can be no doubt that the relationships of those economies to the Eastern bloc and to the many less developed countries — by no means all socialist — that have adopted a largely non-market approach to organizing their economic activity have a monetary aspect. However, given the lack of market institutions underlying these relationships, the analysis that follows has less to say, at least in a direct fashion, about them. Though I shall not entirely ignore these matters here, I shall pay relatively little attention to them. This is not because they are unimportant, but rather because they are sufficiently important to warrant a study in their own right.

The paper is divided into two parts. In the first part, on theoretical issues, five topics are discussed: the monetary approach, fixed exchange rates among national monies, domestic policy under fixed exchange rates, domestic policy under flexible exchange rates among national monies, and the international monetary system under flexible exchange rates. In the second part of the paper, on practical matters, three topics are analyzed: the Bretton Woods system, the recent experience with floating rates, and international monetary reform.

Theoretical Issues

The Monetary Approach

Practical matters cannot be discussed in a vacuum. Much of this paper will be concerned with sketching a theoretical framework in terms of which questions about the international monetary system can be posed and evidence on its operation organized. In particular, the paper will deal with insights yielded by the theoretical and empirical literature of the past decade or so; this literature has been devoted largely to debating the virtues and vices of the so-called monetary approach to analyzing balance of payments and exchange rate issues.¹

The phrase *monetary approach* has more than one interpretation in the

literature. In some contexts, the phrase refers to a very special set of hypotheses about how the real world operates: the demand for money function is stable; purchasing power parity is continuous in the sense that, adjusted for changes in exchange rates, the price levels of individual countries move in lockstep with one another; the international mobility of capital is perfect; and so on. Although each postulate may be a useful approximation to reality in a particular time and place, we shall see that none is generally true. Hence *monetary approach* is used here more loosely to refer to a method of analyzing balance of payments and exchange rate issues that stresses the interaction of the supply of and demand for money.

In this sense, the monetary approach is not a new body of analysis yielding results different from those of other bodies of theory that stress, for example, the role of relative prices in determining trade flows. Rather, the monetary approach provides an alternative and usually simpler way of achieving the same results as would a correct application of these other bodies of theory. What is crucial is that the monetary approach ensures that the monetary elements of balance of payments and exchange rate behaviour cannot be overlooked. The monetary approach is particularly helpful in getting to grips with the consequences for the balance of payments and exchange rates of domestic monetary policies; since much of the instability that has characterized the international monetary system over the past two decades had its origin in unstable domestic monetary policies, the monetary approach is an analytically powerful and simple tool for interpreting recent history.

The analytic power and simplicity of the monetary approach are not achieved costlessly. Though its results are often theoretically clear-cut, they must be applied to real-world situations with care. The approach stresses long-run phenomena, such as the relationships among monetary policies, exchange rates, and price levels. It pays less attention to short-run issues, such as fluctuations in output and employment. Since the duration of these short-run fluctuations is best measured in years, that the monetary approach treats these fluctuations as temporary does not mean that they are unimportant. On the other hand, the long run in economic life is not just a series of short runs. Rather, long run refers to underlying trends that, though always present, are sometimes obscured by shorter-run fluctuations. It is one of the great strengths of the monetary approach that it forces us to pay attention to such trends, because coherent and sustainable economic policy cannot be designed without reference to them.

It is helpful to begin our discussion of the monetary approach on a rather abstract level. Such abstraction will not reveal the whole truth about the world we live in but will help us see clearly certain important properties of that world that are otherwise easy — but dangerous — to overlook. First, let us consider an idealized world in which trade and

capital flows among nations are completely unregulated and in which there is a supranational monetary system that provides just one money, equally acceptable in all countries.² With the important difference that there is no "rest of the world" to which it is open, such a world somewhat resembles the contemporary Canadian economy, with the provinces cast in the role of component countries and the Bank of Canada presiding over the monetary system. Such a world economy has never existed, nor is it ever likely to, and assertions about its properties cannot be directly tested. Indeed, even within Canada, trade and capital flows are not totally unregulated. Nevertheless, as will become apparent as this paper develops, the assertions we are about to discuss do not entirely lack a basis in real-world experience.

It is a well-known proposition that, at any given time, the aggregate of economic agents in an economy seek to maintain their money holdings at a target level that depends on their real income (probably averaged over a period of years, including future years so that expectations are involved here), the level and structure of nominal interest rates on assets other than money, and the general price level. In theory, the aggregate demand for money is strictly proportional to the general price level. As an empirical matter, the stability of the aggregate demand for money function — whether at the level of the national or the world economy — is far from perfect. The demand for money function shifts over time in response to institutional changes in a manner as difficult to predict *ex ante* as it is easy to rationalize *ex post*; it is also subject to random variations, particularly from quarter to quarter and even from year to year. However, the relationship is sufficiently robust on average over two or three years that it must not be ignored in the conduct of monetary policy. Although the relationship cannot be used as a basis for fine-tuning the economy, it must be taken careful account of in the interpretation of economic history, not least recent history.³

The monetary approach starts by assuming that such a demand for money function exists, not only for each national economy but also for the world economy as a whole. Furthermore, if real income and real rates of return can be treated as depending at least on average over time on such factors as the size and productivity of the world labour force and stock of capital and if prices are flexible, the money supply in this world economy must determine its price level. The assumption of free trade ensures that differences in the price level among countries are sustainable only to the extent that the prices of non-tradable goods and services vary among countries. The assumption of capital mobility ensures that a similar statement can be made about interest rates.⁴ Only if the net balance on combined trade and capital accounts of each country with the sum of the others is equal to zero can a balance of payments equilibrium be said to exist in this world.⁵

Any country with a balance of payments surplus will find itself with a

net inflow of money from the rest of the world. That inflow's interaction with the domestic demand for money function will put downward pressure on domestic interest rates and upward pressure on domestic output and prices. These tendencies will weaken the balance of payments until their source is eliminated, but that source is the balance of payments surplus with which we started. Clearly this argument also works in reverse and leads directly to the following insights: in such a world, the role of the balance of payments is to allocate the world money supply among the national economies making up the world economy, and any balance of payments surplus or deficit is a temporary phenomenon reflecting a discrepancy between the quantity of money available in a particular economy and the quantity demanded.

Fixed Exchange Rates among National Monies

All this is very simple, but the international economy of which Canada forms a part is more complex. How do the complications of the real world affect the relevance of this simple analysis? There has never existed an international economy based on free trade in goods and capital that has used one money. However, under the Bretton Woods system (the international monetary system of more or less fixed exchange rates set up after World War II and which collapsed in the 1970s), there did exist a rather liberal international economic order in which national currencies, emitted by domestic banking systems, were exchangeable against one another at more or less fixed rates. Such a world differs in a number of conspicuous ways from a world that uses a single currency.

To begin with, along with the national currency go a series of domestic institutions that apparently make it possible for the supply of any particular national currency to be changed by means other than balance of payments flows. The central bank and the commercial banking system are able to buy and sell domestic debt instruments, whether emitted by the government or the private sector, in exchange for the domestic money that forms the liabilities of the central and commercial banks. There might exist a specifically international money in such a system, but instead of circulating domestically in each country, this money plays a specialized role, being held more or less exclusively by the banking system in the form of international reserves for use in settling payments imbalances. The amount of such reserve holdings on the asset side of the banking system's balance sheet is matched by liabilities held by the general public in the form of domestic money.⁶ Balance of payments flows still affect the domestic money supply, but indirectly through the purchases and sales of foreign exchange reserves by the banking system rather than by direct entry into domestic circulation.

The above-mentioned differences, important as they are from the

viewpoint of the individual country, must not be allowed to obscure the all-important similarity between this world and one of a single money when this world is viewed from the perspective of the international economy: a series of national currencies linked by fixed exchange rates still constitute a meaningful aggregate that may be described as the world money supply; it is still meaningful to talk of a world demand for money function as an aggregate relationship in its own right that, interacting with that world money supply, determines a price level common to all parts of the world economy; and it is also meaningful to talk of a world interest rate to the extent that capital movements are free. For the individual country, the interesting question is whether and how far it can insulate itself from such worldwide influences when it has a national currency and domestic monetary institutions.⁷

When discussing the relationship between the world and domestic price levels under a fixed exchange rate, it is vital to distinguish between two very different issues. First, might the domestic price level in a particular country systematically diverge in the long run from that ruling in the rest of the world under fixed rates (or a world money)? Second, to what extent can the authorities of a particular country, desiring an inflation rate different from that ruling in the world at large, achieve that different rate in the long run when national monies do indeed exist? The distinction between tradable and non-tradable goods is important here. In Scandinavian terms, the distinction is between the open and sheltered sectors of the economy, — the open sector producing goods sold on a worldwide market in competition both at home and abroad with the output of other countries, and the sheltered sector, as a result of the technical nature of its products, having sole access to a closed domestic market.⁸

In any country, the domestic price level is a suitably weighted average of prices ruling in both the open and sheltered sectors, but it is only prices in the open sector that may be said to be determined directly on a worldwide basis. However, the open sector competes with the sheltered sector in domestic markets for inputs, notably labour, and, so the argument goes, the domestic wage rate is largely determined by the world price for tradable output adjusted for the productivity of the domestic labour force. With the price that the sheltered sector must pay for labour thus fixed, and given the productivity of labour there, the price of non-tradable output is also determined.

If the relative sizes of the two sectors or productivity differences between them vary among countries, so will price levels; moreover, if rates of productivity growth differ between sectors among countries, so will inflation rates among countries. In a world of fixed exchange rates, therefore, there is no reason to expect that every country will have the same price level or the same inflation rate, any more than there is reason to believe that the cost of living should be the same in every part of

Canada or that its rate of change should everywhere be the same — though domestic labour mobility tends to dampen any tendency for regional price level disparities to open up continuously within a single country. The point of all this is that the existence of overwhelming evidence to the effect that national price levels and inflation rates do diverge systematically from one another under fixed exchange rates does not mean that domestic authorities have any more long-run control over their own country's inflation rate than they would have under a single world money. In either case, their control would be indirect at best and would arise from the possibility of affecting domestic productivity trends.

Domestic Policy under Fixed Exchange Rates

Suppose that an attempt were made to slow down, by monetary means, the inflation rate in a particular fixed exchange rate country. The authorities would begin to sell bonds to the public to reduce the domestic rate of monetary expansion; in doing so, they would put upward pressure on domestic interest rates. If capital were mobile internationally, this interest rate pressure would attract an inflow of capital; to maintain the exchange rate, the authorities would buy foreign exchange reserves with newly issued money. If domestic bonds and foreign bonds were perfect substitutes, that would be the end of the story: there would occur a substitution of foreign exchange reserves for domestic bonds among the banking system's assets, with no change in the money supply and no consequences for domestic prices and their rate of change.

With less than perfect capital mobility, the authorities' actions would initially reduce the monetary growth rate, which would put downward pressure on domestic aggregate demand. The tradable sector would be induced to switch output from domestic to export markets, while the sheltered, non-tradables sector would shrink, releasing resources to the tradables sector. The balance of payments would improve, reserves would flow in, and upward pressure would be put upon the rate of growth of the money supply. To be sure, the authorities might offset this pressure for a while by so-called sterilization operations, selling domestic bonds at a greater rate than initially, but such operations could not go on forever unless the authorities were willing to accumulate reserves without limit.⁹ Therefore, any attempt to use monetary policy to drive domestic prices away from the time path inherent in the interaction of world prices and domestic productivity trends is eventually futile under a fixed exchange rate. Monetary policy can affect the balance of payments and alter the ratio between domestic bonds and foreign exchange reserves in the portfolio of the banking system, but in the long run, that is all that monetary policy can do.

The phrase *long run* is important here, because there always exists the

possibility under fixed exchange rates that because of some temporary shock, the domestic price level will take a value incompatible with prices ruling abroad at the current exchange rate. In such a case, monetary policy can and indeed must be deployed to correct such a disequilibrium. However, as was shown by Laidler (1975), where contractionary monetary policy is required, it might be appropriate to accompany it with a devaluation to mitigate its short-run effects on real income and employment. This conclusion of course presupposes that the fixed exchange rate regime in operation permits such an adjustment.

It does not follow that if, in the long run, monetary policy affects only the balance of payments, the balance of payments is affected only by monetary policy.¹⁰ For example, an increase in the productivity of labour in the tradable goods sector will undoubtedly lead to a balance of payments surplus for a while. The resulting increase in the domestic money supply will partly go to satisfy an increased demand for real money stemming from the rise in domestic income inherent in such a productivity increase; but the increase in the domestic money supply is also likely to be associated with an increase in the domestic price level as money wages, and hence prices, rise in the non-tradables sector. To give another example, an increase in the world demand for the particular products of the domestic export sector will improve the terms of trade and lead to a temporary balance of payments surplus. In this case too, an increase in the domestic wage level and price level is likely to accompany the resulting increase in the money supply, but some of the increase in the money supply will again be absorbed by an increase in the demand for real balances associated with an increase in the economy's real income. Of course, foreign demand can fall or increase; if demand falls, the processes just described work in reverse. If permissible, an exchange depreciation (appreciation) might be used to offset the contractionary (expansionary) effects on real income and employment that would be likely to accompany adjustment under a rigidly fixed parity.

The proposition that monetary policy influences only the balance of payments under a fixed exchange rate regime is, as we have seen, strictly and generally true only of the ultimate effects of monetary policy. However, when capital is perfectly and instantaneously mobile internationally, any attempt by the domestic authorities to change the money supply is immediately offset by repercussions on the capital account of the balance of payments. If it is possible for domestic interest rates to vary for a while relative to those ruling in the rest of the world, expansionary monetary policy might increase domestic aggregate demand for some time, with higher output and a rising domestic price level (relative to its sustainable long-run path) being the temporary consequences; contractionary policy would have the opposite effects. How long such temporary effects might be sustainable is not a matter about which one can generalize. The more sensitive are trade flows to relative price

variations and the more mobile is capital in response to interest rate differentials, the shorter and less significant these effects can be. As a practical matter, the scope for capital mobility to undermine even the temporary effectiveness of monetary policy seems greater than that of trade flows. In any event, in the absence of changes in the world economy, the policy that produces such temporary effects must always be given up eventually if a fixed exchange rate is to be maintained or perhaps even put into reverse for a while if that policy's effects on the banking system's holdings of international reserves take them outside some desired limits. Here again the possibility of parity changes as part of the adjustment mechanism might arise.

There is also fiscal policy, of course, and one of the principal messages of the well-known 1960s-vintage Mundell-Fleming model of macro-economic policy in an open economy is that under a fixed rate, monetary policy is powerless whereas fiscal policy is particularly effective.¹¹ That model has it that with a fixed exchange rate and a high (in the limit, perfect) degree of capital mobility, expansionary fiscal policy cannot be crowded out by rising interest rates. Furthermore, that prices are largely determined on world markets means that the main effect of fiscal policy must be on domestic income and employment. Unfortunately, viewed from the vantage point of analysis developed in the 1970s, including the monetary approach, there are a few important qualifications to this optimistic result.

To begin with, and obviously, this result can hold only in an economy in which resources are initially less than fully utilized. If they are fully utilized, increased demand for output will tend to put upward pressure on domestic money wages and prices and hence have an adverse effect on the trade balance. In effect, the resource constraint on the economy's capacity to supply output will ensure that extra government expenditure or private expenditure induced by tax cuts crowds out production elsewhere, including that of export and import substitutes. Moreover, that resource constraint is not one that is suddenly encountered at a specific level of output. Rather, the constraint becomes more and more binding as output expands toward capacity, and a degree of crowding out will, therefore, be encountered even in less than full employment situations. A higher level of real output will be associated with higher imports and hence with a deterioration of the trade account. Given a high degree of capital mobility, this deterioration could certainly be covered by capital inflow; but such an increase in net indebtedness abroad implies a need to run a trade account surplus at some time in the future both to service an increased foreign debt and to repay it eventually. To the extent that the public understand this need and take account of this reduction in their future incomes when planning current expenditure, private sector expenditure will fall, and a form of crowding out will come into play.¹²

The possibility that an increasing foreign debt might engender doubts

in world capital markets about a country's ability to maintain its exchange rate in the long run is a possibility not normally assumed to arise in theoretical analyses of fixed exchange rate regimes. However, this possibility can be important in the real world under regimes that permit parity changes. If domestic fiscal expansion does lead foreign lenders to begin to entertain such doubts, their behaviour will in effect falsify the assumption of a high degree of capital mobility upon which the Mundell-Fleming results depend, for lenders will demand an interest premium (perhaps rising over time) for continuing to hold or increase their holdings of domestic debt. A crowding-out mechanism would come into play, but in this instance, it would be more important in the context of a sustained expansionary fiscal policy than in that of short-term, counter-cyclical measures.¹³

The effectiveness of monetary and fiscal policy as demand management tools is limited under fixed exchange rates, and so is that of wage and price controls as long-term anti-inflation devices. As Johnson (1972b) argued, at least for relatively small open economies, to try to control the long-run inflation rate by way of price controls under a fixed exchange rate is to attempt to use domestic tools to influence a variable whose behaviour is primarily determined on world markets; and such an attempt is unlikely to succeed for very long. Indeed, any short-run success that such a policy might have would strengthen the longer-run forces it was seeking to offset. If money wages and prices in an open economy are kept from rising as fast as they otherwise would by controls, the balance of payments will improve and domestic monetary expansion speed up, thus increasing demand-generated inflationary pressures, which will continue to build up as long as controls exert any influence. Inevitably, under such circumstances, controls will break down. However, if the problem faced by the domestic economy is a short-run burst of *domestic* inflation incompatible with trends in the world economy, temporary wage and price controls might — at least in principle — ease the return to equilibrium, provided controls are coordinated with other policies.

As far as the effect of fixed exchange rates on domestic policy is concerned, the foregoing analysis, based upon Johnson's "The Monetary Approach to Balance of Payments" (Johnson, 1972) confirms long-held beliefs. Under such a regime and given a rather liberal international order as far as trade in goods and, in particular, capital is concerned, the operations of the balance of payments mechanism put severe limits on the conduct of domestic policy. Although goods markets seem to adjust slowly enough that the constraints they impose are long-run in nature, it is a different matter with capital markets. With a highly integrated world capital market such as now exists, a fixed exchange rate economy has no choice but to accept the world interest rate. Therefore, monetary policy under a fixed exchange rate is primarily a device for influencing the

balance of payments and hence for maintaining the exchange rate, not a tool that can systematically be used for domestic stabilization purposes. Although fiscal policy can be used for domestic stabilization, it is more likely to be effective over short periods than to be capable of producing important effects sustainable in the long run; and wage and price controls have no chance of influencing inflation in any lasting fashion.¹⁴

In the past, such conclusions as these have been widely believed to provide the basis of the case for flexible exchange rates. These conclusions certainly seem to imply that a fixed rate regime puts a balance of payments constraint upon the conduct of domestic policy that would not exist under flexible exchange rates. In large measure, this conclusion is misleading. The basic constraint on domestic economic policy arises from national economies having finite productive resources and forming part of a larger world economy. Under fixed exchange rates, this constraint manifests itself in the behaviour of the balance of payments and is particularly visible. As we shall now see, this constraint does not go away under flexible exchange rates; it simply manifests itself in different, less immediately recognizable ways.

Domestic Policies under Flexible Exchange Rates among National Monies

Provided national monies are convertible into one another at fixed rates of exchange, their aggregation is straightforward and unambiguous, and the notion of a world money supply has a clear meaning. To someone analyzing the world economy, the most significant difference between fixed and flexible exchange rates is that with flexible rates the idea of a world money supply is no longer clear-cut. The world economy continues to exist, but it is no longer the natural place in which to study the interaction of the supply and demand for money. As we shall see, to say that the notion of a world money supply is not clear-cut under flexible rates does not mean that it is totally without meaning or relevance or that such a regime raises no issues for the behaviour of the world economy per se. Nevertheless, it is convenient to begin our discussion of flexible exchange rates at the level of the nation state. Here the obvious questions, much discussed in recent years, concern the extent to which the adoption of flexible rates both protects the economy from shocks originating abroad and removes constraints from the conduct of domestic policy.

Under flexible exchange rates, the domestic banking system has no obligation to exchange domestic against foreign money at a fixed price. Therefore, even in the long run, the domestic money supply is completely under the control of the authorities, and those factors that under a fixed exchange rate lead to balance of payments flows lead under a flexible rate to exchange rate changes. Given that there exists a stable

demand for money function at the level of the national economy and given that on average in the long run, the time path of real income and real interest rates is determined by supply side factors, including those characterizing the world economy, control of the quantity of money also gives the domestic authorities control of the long-run average value of the domestic inflation rate, which no longer depends upon the interaction of the world price level and productivity trends in various sectors of the domestic economy.¹⁵ Instead of being a constant whose maintenance forces the domestic money supply to conform to the behaviour of other variables, the exchange rate is free to move to reconcile the behaviour of domestic prices with that of prices in the rest of the world.

Under flexible rates, monetary policy is not the only factor affecting the exchange rate any more than under fixed rates it is the only factor affecting the balance of payments. Just as an increase in productivity in the traded goods sector or an increase in world demand for the goods that sector produces will, under fixed exchange rates, usually lead to an increase in the domestic price level relative to that in the rest of the world, so, under a flexible rate, will such changes usually lead to an appreciation of the currency.¹⁶ In either case, the cause in question must lead to the price of labour in the domestic economy rising relative to that of the rest of the world. Under a flexible rate and with a given quantity of nominal money, the domestic price level will also tend to fall as a result of the influence of an increase in real income on the demand for money, but not by enough to offset the tendency of the currency to appreciate. The non-tradables sector and those parts of the tradables sector not directly affected by the shock under consideration will therefore contract, just as they will under a fixed rate when a higher domestic wage and price level puts pressure upon them.

Flexible exchange rates do nothing to shelter an economy from the consequences of underlying shifts in the conditions of supply and demand for the goods and services it produces and consumes. Such shifts usually require *relative price* changes to accommodate them, and though these shifts will manifest themselves in different *money price* behaviour under different regimes, they will still occur. There is nothing that can be done by domestic monetary policy to offset such real changes under any exchange rate regime. The most that can be claimed here for a flexible exchange rate is that relative to a fixed rate, a flexible rate might under certain circumstances ease the transition to the new equilibrium required by some exogenous real shock. In particular, where that shock requires a fall in domestic real wages relative to those in the rest of the world, it may be easier for this transition to occur by way of a currency depreciation with domestic money wages remaining constant or even rising a little than by way of a fall in domestic money wages with the exchange rate held constant.¹⁷

Even this conclusion cannot be taken for granted. Because a currency

depreciation permits a real wage cut to be imposed simultaneously on everyone, the conclusion will be true for an economy in which the need for a fall in real wages is perceived but is held up under a fixed exchange rate by the reluctance of any sector of the labour force to be the first to accept a money wage cut. However, in an economy in which there is what Hicks (1974) has called real wage resistance, so that the dynamics of money wage behaviour are heavily conditioned by the interaction of wage and price levels, a currency depreciation might be but the first twist of a so-called vicious circle of price and money wage inflation accompanied by continuous depreciation and domestic monetary expansion. There is nothing inherent in the structure of an economy operating a flexible exchange rate that ensures that an inflationary bias will be imparted to price level behaviour. However, if that economy has a labour force whose resistance to real wage cuts is accompanied by the political power to influence the monetary authorities, such a bias becomes a real possibility.¹⁸

It has long been known that the adoption of a flexible exchange rate permits the domestic economy to choose its own long-run inflation rate, and this fact was at one time seen to constitute a major advantage for such a regime. Expansionary domestic policies that might have led to a high long-run level of employment also, according to the logic of the Phillips curve, led to inflation; and the adverse consequences of inflation for the balance of payments under a fixed rate regime seemed to impose a serious and unnecessary constraint on the achievement of domestic goals of high employment. This argument is now recognized as quite false. The Phillips curve exists as an apparently stable relationship only as long as economic agents' expectations of inflation remain rather stable over time; in an open economy, an important factor guaranteeing the stability of expectations might be a fixed exchange against a non-inflationary world money. Thus the removal of the fixed exchange rate which constrains economic policy from exploiting the Phillips trade-off, also removes the trade-off, which was in fact never a stable long-run relationship. Expectations about inflation become geared to domestic inflationary experience — or perhaps to the pronouncements and actions of domestic policy makers — and though the flexible rate economy is able to choose its own inflation rate, it can realize no permanent gain in terms of income and employment from higher inflation.¹⁹

Even so, the long-run inflation rate is a variable of political importance, and in the absence of any systematic inflation-unemployment trade-off, there would be widespread agreement that price level stability or at least a low inflation rate is a desirable goal in its own right. In a fixed exchange rate world and in the absence of severe restriction of trade and capital movements, such a goal is attainable for the individual country if and only if the international money, which lies at the base of the system, is more or less inflation free in the long run. Although the case for flexible

exchange rates in the 1950s and 1960s was as often as not put in terms of the ability they conferred on the domestic authorities to choose a higher inflation rate than that ruling in the rest of the world and thereby realize output gains, the case in the 1970s and 1980s may be cast in terms of flexible rates' permitting those same authorities to choose a lower and perhaps more stable inflation rate than that ruling elsewhere.²⁰

The argument here is correct as far as it goes. A flexible exchange rate country may choose its own long-run inflation rate and may change that rate independently of the world inflation rate; if the world inflation rate should change, there is no reason why a flexible exchange rate economy should import that change. It does not follow, however, that it is an easy business for a country to change its inflation rate relative to that of the rest of the world or that a country is insulated from all side effects when the world inflation rate changes. The very same wage and price stickiness that lends a degree of short-run independence to domestic monetary policy under a fixed exchange rate and that might confer a short-run advantage on flexible exchange rates in the face of real shocks ensures that the insulating powers of flexible rates against monetary shocks are far from complete. The general issue to which we are referring here is exemplified by the problem of exchange rate overshooting analyzed in recent literature by Niehans (1975) and Dornbusch (1976).²¹ Although some macroeconomists have recently challenged the assumption about wage-price stickiness that gives rise to this phenomenon (see Barro, 1979; Lucas, 1977; or Parkin, 1982 for a textbook exposition), the majority view would still seem to be that it is a reasonable assumption to make.

Overshooting arises in the following way. When a country reduces its rate of monetary growth, the ultimate effect is a slowdown in its inflation rate, a fall in its nominal interest rates, and a steady appreciation of its currency. However, if wages and prices are sticky, the initial effect of such a change in policy is mainly an increase in nominal interest rates. Agents operating in capital markets are presumed to understand these effects and to take account of them in planning their activities. The first-round effect of these activities therefore must be a capital inflow, which will continue to drive up the current value of the currency until the expected return on holding assets denominated in domestic currency is brought into equality with that ruling elsewhere in the world. Since domestic nominal interest rates are now higher, since domestic money wages and prices move only sluggishly toward their long-run values, and — crucially — since this sluggish movement is anticipated, this equalization of expected returns can be achieved only by an immediate overappreciation of the currency to a level from which it then moves down (at least relative to trend) toward its equilibrium time path.²²

Such overshooting in response to monetary policy brings both benefits and costs. To the extent that the domestic price index is influenced by import and export prices, overshooting helps reduce inflation more

rapidly than would otherwise be the case when monetary policy tightens up. However, overshooting has this effect while simultaneously imposing a competitive disadvantage upon the tradable goods sector of the economy. Conventional wisdom has it that a slowdown in monetary growth takes between eighteen months and two years to have its first noticeable effects on domestic inflation; this disadvantage can, therefore, last quite long enough to do serious damage to the tradables sector. Though it is usual to analyze overshooting as a consequence of an attempt to slow down domestic inflation relative to that of the rest of the world, it should be noted that a step up in world monetary expansion imposes the same burden on the tradables sector of an economy that does not follow the world trend. Also, overshooting in response to monetary policy works in both directions; a tightening of monetary policy in the world economy designed to bring its inflation rate down can, therefore, lead to a temporary overdepreciation of the domestic currency and so to a tendency for the tradables sector to overexpand and the domestic inflation rate to rise temporarily to a rate higher than is ultimately compatible with domestic monetary policy.

The analysis of overshooting just discussed exemplifies a general characteristic of the properties of flexible exchange rates, and the characteristic in question may be described as follows. As Frenkel (1981b) and Mussa (1982) have stressed, the foreign exchange market is an asset market, and the prices ruling there are highly flexible. At the same time, the agents operating in that market make their decisions on the basis of their expectations about the likely future course of the values of the currencies in which they deal. New information about anything that affects expectations about those future values will therefore influence the exchange rate the moment such information becomes available. Quite modest policy changes, for example, can therefore have large effects on the exchange rate if these policy changes affect expectations. Moreover, to the extent that the domestic variables that might ultimately absorb the effects of such shocks are slow moving, such effects will be further exaggerated. This conclusion is true of the consequences of a monetary policy change, which is what Niehans and Dornbusch analyzed, but it also holds true for the consequences of any other event that can influence the exchange rate.

In the light of the foregoing discussion, it is small wonder that a completely free-floating exchange rate whose behaviour is completely ignored by the authorities is more often found in the writings of academic economists than in the real world. There, so-called dirty floating, under which the authorities intervene to influence the behaviour of the exchange rate in the hope of gaining the long-term advantages of flexibility while mitigating the short-term costs, is much favoured. Of course, the very concept of a dirty float is far from clear-cut. I use *dirty float* here to refer to a policy regime in which the monetary authorities

vary the quantity of money to influence the exchange rate *per se* rather than to pursue purely domestic goals. But to the extent that the behaviour of the exchange rate itself impinges upon domestic variables, the border between a clean and dirty float is certainly easier to define in principle than in practice. Though there has been some academic work on the principles that ought to underpin authorities' intervention in the foreign exchange market, if such intervention is to be optimal in achieving its ends (see, for example, Boyer, 1978c; Fortin, 1979; Sparks, 1979; or Frenkel and Aizenman, 1982, all of whom build upon Poole's 1970 analysis of optimal monetary policy in a closed economy), it would seem that the knowledge needed to implement such principles systematically in the real world is simply not available. Dirty floating has in practice, therefore, been very much an *ad hoc* business.²³

Monetary policy is difficult to implement smoothly under flexible exchange rates, but it can at least be expected to have sustainable long-run effects on prices, not to mention shorter-run impacts on output and employment. Fiscal policy is of limited use for demand management under such a regime. To the extent that fiscal expansion puts upward pressure on domestic interest rates and does not undermine international confidence in the future stability of a country's monetary policy, fiscal expansion will tend to cause an appreciation of the value of the domestic currency. This appreciation will in turn reduce exports and increase imports, with the net effect of government expenditure completely crowding out output in the tradable goods sector of the economy. This result, which harks back to the Mundell-Fleming analysis of the 1960s does, of course, hinge upon an enlarged fiscal deficit's affecting neither the price level, nor confidence in the future stability of monetary policy. If the price level is affected, short-run output expansion becomes a possibility. At best, though, such effects are short-run, and any significant effect on confidence in the future stability of monetary policy stemming from fiscal deficits can have adverse consequences too obvious to need specifying here.

All in all, it is difficult to see more than a very limited scope for fiscal policy as a demand management tool under flexible exchange rates. (This conclusion does not necessarily mean that specific job creation schemes addressing structural labour market problems and financed without increasing the overall deficit may not influence employment levels in particular times and places.) Nor can one be optimistic about wage and price controls as anti-inflation devices, particularly as long-term anti-inflation devices. As I have argued elsewhere (Laidler, 1982), to the extent that such controls are effective, they cause demand pressures, which might have been absorbed by domestic price rises, to spill over into the foreign exchange market and depreciate the currency. Thus controls divert inflationary pressures from one sector of the economy to another under flexible exchange rates and do not lower the overall

inflation rate.²⁴ One important qualification needs to be noted here, though. The above conclusion applies more clearly to the case where controls are used *instead* of more orthodox anti-inflation policies, and it does not rule out the possibility that controls deployed *as temporary supplements* to monetary contraction might help an economy make a transition to lower inflation at a smaller cost in unemployment than the economy might otherwise have to bear.

The implications of the analysis of the past few pages are easily enough stated. The economic basis of the case for flexible exchange rates is not as strong as it was once believed to be, even when the desirability of such a regime is judged solely from the viewpoint of the individual economy. That economic case rested in good measure on the postulate of a long-run inflation-unemployment trade-off, and this trade-off has turned out to be illusory. Nevertheless, this analysis does not mean that the case for flexible exchange rates can no longer be made. Rather, as Friedman (1953) saw thirty years ago, it means that there is a strong political element to the case. A flexible exchange rate perhaps confers on the domestic authorities a certain degree of short-run room to manoeuvre in the conduct of stabilization policy. But that is not the main point: a flexible rate also permits them to pick the path of the domestic inflation rate even in the long run. If the inflation rate is a variable of great political importance —and it seems to be — the relevant authorities can take responsibility for the inflation rate only if they operate (though not necessarily cleanly) a floating rate. Flexible exchange rates, therefore, are the natural institutional arrangement in a world in which political power is exercised at the level of the nation state and in which electorates expect their governments to make effective decisions about the inflation rate.

The International Monetary System under Flexible Exchange Rates

The world economy does not cease to exist when a floating rate regime is adopted. Even though there is nothing that may be defined unambiguously as a world money supply, goods and assets traded across international boundaries nevertheless have to be invoiced and paid for, and some national currency or currencies must play this specifically international role. These facts have recently come in for a good deal of analysis, much of which, in the current state of knowledge, must be regarded as controversial.²⁵

It is a fundamental proposition of monetary theory that in a closed economy (considered over a period long enough for prices to be treated as fully flexible), the nominal quantity of money may be determined by the monetary authorities, but its real quantity will be decided by money holders. Their behaviour will ensure that, in the long run, the price level

moves to convert the nominal quantity of money supplied to whatever real quantity is demanded. Provided their liabilities are readily convertible into one another at guaranteed fixed rates, it does not matter whether there are multiple suppliers of nominal money in such a closed economy. The results of closed economy monetary theory are therefore applicable to a world economy characterized by fixed exchange rates among national currencies.

An interesting theoretical question, first posed in 1972 by Boyer in an initially unappreciated paper not published until 1978 (Boyer, 1978b), concerns what happens in a system with multiple suppliers of nominal money when there are no rules governing the price at which a unit of one currency trades against another. There still exists a determinate aggregate demand for real money in such a system, but such a quantity of real balances can be made up in an infinity of ways, each involving different exchange ratios among currencies. At first sight, this indisputable fact seems to imply that under a system of flexible exchange rates, the value of any particular currency is indeterminate. Since a monetary system of multiple currencies with indeterminate exchange rates would not be viable, it might seem that without direct government intervention, a flexible exchange rate system would evolve into one in which only one nominal currency was used in all transactions, with the values of all the other currencies being driven to zero — to a system, that is to say, in which one national currency served the entire world economy.²⁶

The basic purpose of a monetary system is to provide an environment where trading can be carried on with a minimum of resource costs. From this point of view, there can be no doubt that a one-money system is more efficient than one that uses multiple monies; nor can there be much doubt that left to themselves, market forces do tend to move a multiple-money system toward the use of a single money. However, we must not ignore certain important institutional facts that work against this tendency. In particular, it is just not the case that in the world as it now exists, any currency is equally acceptable as a means of exchange in any transaction, regardless of where and between whom it is carried out. In our world, transactions carried on within the boundaries of a particular nation state must be carried out using (by force of custom often backed by law) that nation state's national currency. There is, therefore, a well-defined, real domestic demand for each national currency, derived from its domestic use; and underlying the conventional theory of flexible exchange rates is the idea that the nominal supply of each domestic currency, interacting with this real domestic demand for it, determines both the domestic price level in each country and — given that tradable goods must have the same price everywhere in the world — the exchange rates among domestic currencies.²⁷

Not all transactions take place within national boundaries; those that do not give their participants the opportunity to choose among curren-

cies. To put it in the terminology of the academic literature, though perfect substitutability among currencies, which would lead to completely indeterminate exchange rates, is a figment of the economic theorist's imagination, there may well exist in the modern world a sufficient degree of substitutability among currencies in international transactions to imply that any analysis of flexible exchange rates that looks only at domestic issues and neglects the specifically international aspects of the international monetary system may be misleading.

Because there exists a demand for money that arises from international transactions and that must be met out of supplies of domestic currencies, McKinnon (1982) has suggested that it might be misleading to think of increases in the supply of a particular domestic money as influencing only the domestic price level of the country that emits it. He has argued that, to the extent that a particular domestic currency is used in international transactions, an increase in the nominal quantity of that national money will increase the nominal quantity of international money and will therefore raise prices measured in all currencies. This argument is correct if monetary authorities in other countries are involved in some kind of dirty float designed to maintain some target range for the exchange rate of their own currency on the one in question, but not in the case of a clean float. If the real demand for a particular currency does not change in the wake of an increase in its supply, its purchasing power over everything, including other currencies, will fall equiproportionally. There is no reason to alter this conclusion just because some of the real demand for a particular currency stems from its international use.

There is a presumption that where different currencies compete with one another, the one that promises the most predictability in its purchasing power will come to be favoured. To the extent that predictability and constancy of purchasing power are related to each other — and they certainly are not identical — one might expect a speed-up in the creation rate of a particular nominal money to make it less desirable as a means of exchange in international transactions.²⁸ For this reason, currency substitution might have an independent influence on the demand for national monies, and exchange rates among currencies might be expected to move independently of the interaction of their supply and domestic demand. Such empirical work as has addressed this issue (for example, Brittain, 1981), though far from conclusive, suggests that this hypothesis might go a little way toward explaining the instability that has seemed to characterize demand for money functions over the past decade, particularly for the United States and West Germany. Currency substitution does not, however, seem to have been very important in the case of Canada (see, for example, Cuddington, 1983 and Poloz, 1981).

These arguments seem at first sight to imply that there is an irreducible element of volatility to the world monetary system under flexible rates

that would be absent under a fixed rate regime. So they do if a flexible rate regime is compared with one of irrevocably fixed rates; but this comparison is not the only one to be made. One might also compare flexible rates with arrangements such as existed under the Bretton Woods system, whereby rates were fixed subject to the ability of member countries simultaneously to meet other policy goals. Under such an arrangement the same demand for money shifts arising from currency substitution that make flexible exchange rates potentially volatile can lead to “hot money” movements and balance of payments instability and can indeed undermine the ability of countries to maintain fixed exchange rates. To the extent that governments must be concerned to avoid sudden changes in their exchange rate, arguments about currency substitution imply that there exists some international discipline on the conduct of domestic monetary policy even under flexible exchange rates. These arguments do not imply that flexible rates are impractical.

Practical Matters

So far, this paper has expounded general principles of analysis rather than applied them to specific issues. However, these principles were developed largely in response to particular policy problems, and it is now time to discuss the international monetary system as it has evolved over the past quarter century or so. The history of international monetary arrangements over this period covers the heyday of the Bretton Woods system, its decline during the latter part of the 1960s and its piecemeal replacement in the 1970s with the current ad hoc but predominantly floating rate system.

The Bretton Woods System

By the mid-1950s the use, particularly by European countries, of quantitative restrictions on trade and capital flows for balance-of-payments purposes which had marked the immediate postwar period of the so-called dollar gap, had greatly diminished. The Bretton Woods system was, therefore, becoming a system of fixed exchange rates among more or less convertible currencies. Exchange rates were not rigidly fixed because countries suffering from fundamental balance-of-payments disequilibria could alter their exchange rates.²⁹ However, the opportunity to vary parities was seldom exercised. Even Canada, which adopted a nominally floating rate against the U.S. dollar in 1950, pursued a domestic monetary policy that kept the exchange rate fluctuating within very narrow bounds throughout the 1950s. With the benefit of hindsight, we may judge Canada to have run something rather close to a fixed exchange rate during the 1950s and hence to have been de facto part of the Bretton Woods system for most of the period.³⁰

A system of fixed exchange rates among national currencies requires an international money for use as a reserve currency and must provide for control of the reserve currency's creation. Keynes originally intended that in the postwar world, the International Monetary Fund (IMF) would play the role of a world central bank and that its paper liabilities — Bancor — would play a key role as an international means of exchange for the system; but this is not how the system was set up, let alone how it evolved. Instead of acting as a central bank, the IMF came to play, in essence, a supervisory function for countries in balance-of-payments difficulties. The IMF made credit available to such countries to enable them to maintain their exchange rates while corrective policies were put in place and also periodically ensured that the policies in question were undertaken. In the rare cases where changes in exchange rates were deemed desirable, the IMF helped coordinate the changes with a view to avoiding the competitive rounds of devaluation that had plagued the 1930s.

Under the Bretton Woods system, the IMF was excluded from the all-important business of providing an international money (or was excluded at least until the introduction of the Special Drawing Rights [SDR] in 1970).³¹ This task fell upon the monetary authorities of the United States, not entirely by conscious design (though the fact that the recipients of Marshall Plan aid were forbidden to use IMF facilities must certainly have inhibited that institution's development), but mainly because in the wake of World War II, only the U.S. dollar was able to provide the monetary foundation upon which a liberal international economic order could be rebuilt. The U.S. dollar was convertible into gold at a fixed price of \$35 per ounce, and gold also functioned as an international money; but gold did not influence money creation in the United States. It is therefore a mistake to regard Bretton Woods as having provided a variation on the gold exchange standard. Although gold was an international money and remnants of the sterling area survived World War II, Bretton Woods was a key currency system based on the U.S. dollar.³²

Needless to say, all of this is much clearer with the benefit of two or three decades of hindsight than it was at the time, and from the mid-1950s onward, there was much discussion of the roles of the U.S. dollar and gold in the international monetary system. As the world economy grew in the postwar period and barriers to trade and capital flows were removed, so the demand for international liquidity naturally grew in countries other than the United States. Countries were able to satisfy this demand by collectively running a balance-of-payments surplus with the United States whereby they obtained either dollars or gold to add to their reserves. In either case, with a fixed dollar price of gold, the result was a continual fall in the ratio of the value of U.S. gold holdings to the value of U.S. short-term foreign liabilities; this falling ratio in turn gave

rise to doubts, expressed as early as 1960 by Robert Triffin (see Triffin, 1960), about the ability of the Bretton Woods system to continue to meet growing demands for world liquidity and even about the system's ultimate stability.³³

Crudely put, Triffin's argument was as follows: the demand for the U.S. dollar as a reserve currency derived from the dollar's convertibility into gold, the ultimate reserve currency; as that convertibility was undermined by a falling ratio of the value of gold to the value of U.S. short-term liabilities, so was the demand for U.S. dollars; as a result, a flight from the dollar became increasingly likely, and the Bretton Woods system was fundamentally unstable because it provided for no orderly means of devaluing the U.S. dollar.

The pure logic of the argument is flawless, but its first premise, that the demand for dollars was ultimately a demand for gold, is very much open to question. For those who believe the demand for dollars to have been a demand for a universally acceptable currency of stable and predictable purchasing power, convertibility into gold was an inessential property of the Bretton Woods system. In their view, gold could have been demonetized rather than, as some proposed, raised in price, and — subject only to appropriate behaviour on the part of the U.S. monetary authorities — the world could have continued indefinitely on a dollar standard.

Although I agree with this latter interpretation of the roles of gold and the dollar in the Bretton Woods system, the case for this interpretation cannot be argued with complete confidence because the matter was never put to the acid test. Although U.S. fiscal institutions provided built-in stabilizers from the 1940s onward and fiscal deficits were tolerated quite readily in practice during the 1950s, there can be no doubt that from the early 1960s onward, the rhetoric of American policy became more Keynesian. The practice of American policy also became more Keynesian, not only with the use of a tax cut to promote employment goals, but — perhaps even more important — with a relatively small, nevertheless systematic increase in the rate of monetary expansion after 1962. By 1966, the Johnson administration was firmly committed to its “war on poverty” and the Vietnam War had reached serious proportions. What had initially been a modest relaxation of the stance of U.S. monetary policy developed into a steady increase of the U.S. rate of monetary expansion as the decade progressed. One suspects that this increase was not a matter of conscious design, but a by-product of the fiscal pressures implicit in the administration's decision to fight both its wars without significant tax increases. This monetary expansion ultimately undermined the Bretton Woods system but not before setting in motion the worldwide inflation from which the Western world has yet to recover.³⁴

Under a fixed exchange rate system, where a particular national currency also plays the role of international money, the limits on the

conduct of monetary policy are not the same in the key currency country as they are in peripheral countries. In peripheral countries, the balance-of-payments mechanism ensures that monetary policy can have only short-term domestic effects and must ultimately be geared to maintaining the stock of foreign exchange reserves within an appropriate range. This is the sense in which the balance of payments constrains the pursuit of domestic goals. The balance of payments does no such thing in the centre country, whose balance-of-payments deficit will always be absorbed into the reserve holdings of the rest of the world. For a peripheral country, too expansionary a domestic monetary policy involves a balance-of-payments deficit and a need to reverse the policy; for the centre country, too expansionary a policy involves a deficit, but no requirement that policy be reversed, at least as long as the future of the country's currency as the base of the international monetary system can be taken for granted. Instead, the effects of too expansionary a policy will work through to excessive growth in international reserves, thence to excessive growth in national money supplies, and so to an increase in the inflation rate throughout the system.

That is what happened to the Bretton Woods world as U.S. monetary policy became steadily more expansionary during the 1960s. This trend steadily undermined what, with benefit of hindsight, we can see was the key to the system's long-term viability, namely, stability in the purchasing power of the key currency. However, the above simple diagnosis was difficult to make at the time and might be a matter of some controversy even now because many factors complicated the monetary history of the late 1960s.³⁵ One such factor was the growth of the so-called Eurodollar market. In this market, banks, located mainly in Europe and some of them subsidiaries of U.S. resident banks, borrow and lend in U.S. dollars, often at short term; in the process, liabilities viewed by many as good substitutes for national monies, including U.S. national money, are created.

In principle, the development of the Eurodollar market in the 1960s could have been inflationary in its own right; in practice, it is doubtful that it was. First, Eurodollar deposits are overwhelmingly term deposits and are marketed in wholesale-sized lots. Second, even though Eurodollars might be substitutes on the demand side for money, on the supply side, the providers of Eurodollars hold small reserves of U.S. money against Eurodollars; this holding of reserves implies an increase in the demand for money, offsetting to some extent the influence of the existence of Eurodollars in the demand of ultimate wealth holders for U.S. money. Third, and most important, had Eurodollars been an independent source of inflation in the late 1960s, there would have been otherwise unexplained downward shifts in national demand for money functions at that time. Such shifts did not appear until the early 1970s, after the Bretton Woods system had collapsed. Though Eurodollar

interest rates can be shown to have influenced the demand for money in some countries, the influence was stable and predictable; it was the consequence of the growing internationalization of short-term capital markets, not of some inflationary flight from national monies.³⁶

The United States was not the only country whose domestic policy was inflationary under the Bretton Woods system: France had devalued and instituted a partial currency reform in 1959, and the government's response to the events of 1968 was to accommodate large nominal wage increases; Britain's misconceived "Dash for Growth" of 1963–64, based on fiscal and monetary expansion, culminated in devaluation in 1967, and the experiment was repeated, with similar results, in the early 1970s; Italy had become seriously inflation-prone by the early 1970s; and so on. Moreover, it is a mistake to attribute all fluctuations in inflation rates to monetary causes. As has been shown (Laidler, 1976), social unrest ought to be accorded a role in the inflation of the 1960s and 1970s, if only as a factor determining the timing and magnitude of particular short-run, but nevertheless significant, fluctuations in national inflation rates relative to worldwide trends.

Nevertheless, as Genberg (1975) has shown, from the mid-1950s to 1970, the variability in the inflation rates of OECD countries was no greater than that among major U.S. cities over the same period. This finding strongly suggests that the Bretton Woods world should be regarded as a single monetary system. More recently, Darby, Lothian, et al. (1983) have presented theoretical and empirical arguments in support of the view that under Bretton Woods, the United States was the only country whose domestic policy could and did create a long-run increase in inflation throughout the world economy. In doing so, the United States destroyed the background of monetary stability that peripheral countries had taken for granted in evolving the rules of thumb upon which their own domestic policies were based. Thus, national Phillips curves, which had seemed to promise stable trade-offs between inflation and unemployment, shifted as the inflation rate in the world economy began to move upward, and a balance of payments surplus could no longer be taken as a reliable indication that domestic policy could safely become more expansionary.³⁷

The speed with which such changes were perceived by policy makers varied from country to country, and 1969–72 was a period of considerable confusion in the conduct of macroeconomic policies in Western economies. Countries early to realize that their balance of payments was a source of inflationary pressure — for example, Canada and West Germany — began to permit their currencies to appreciate against the U.S. dollar. These countries suffered less in the first round of inflation than they otherwise might have, but only at the cost of weakening their commitment to the Bretton Woods system. By mid-1971, the system was in a crisis, and the Smithsonian Agreement of December 1971 provided

for a realignment of currencies within the system and a devaluation of the dollar against gold. Had the Smithsonian Agreement been accompanied by serious efforts among member nations to coordinate their domestic policies, it might have rescued the Bretton Woods system. However, no such attempts were made; indeed, in the summer of 1971, the Nixon administration attempted to combine wage and price controls with vigorous monetary expansion as a simultaneous cure for U.S. inflation and unemployment. The U.S. example was soon followed in the United Kingdom, but not elsewhere, with the result that the Smithsonian Agreement collapsed in mid-1972. Nothing replaced it and, *faute de mieux*, by 1973 a floating rate regime had come into being.³⁸

The Experience with Floating Rates

The adoption of floating exchange rates is often characterized as one of a series of important exogenous shocks that propelled the world economy into the inflation and accompanying economic stagnation of the 1970s. This is, for example, the position taken by McCracken et al. (1977). The interpretation advanced here is very different, namely, that the adoption of floating rates was a consequence of long-standing and unevenly distributed inflationary pressures largely associated with a chronic divergence of domestic fiscal and monetary policies already present in the system. By 1971, when national governments began to take different positions about what domestic inflation rate was desirable and what policies were appropriate to achieve government ends, the fixed rate system was no longer able to cope with the consequences. Countries that tried to combine wage and price controls and domestic monetary expansion — for example, the United States and Britain — found that their policies did not work but did not abandon them before their own inflation rates had risen considerably. Countries that relied on the traditional methods of tight money to control the price level — for example, West Germany and Switzerland — could not simultaneously maintain those policies and their exchange rates in the face of pressures from the balance of payments emanating particularly from the United States; and had to allow their currencies to appreciate.

The world's experience with floating rates has been very different from what academic advocates expected. But with the benefit of hindsight and of the developments in economic theory discussed in the section on theoretical issues, we can make some sense of that experience. The salient unexpected facts are the degree of volatility exchange rates have displayed and the sustained shifts in real exchange rates that have taken place since 1971, not to mention the extent to which, under floating rates, national monetary authorities have continued to hold and use foreign exchange reserves. Some of the volatility displayed by the international monetary system in the 1970s undoubtedly had its origins in the series of

real shocks that hit the world economy in the early 1970s. There *were* bad harvests; the anchovies *did* disappear for a while; there *was* a series of explosions in international commodity prices; OPEC *did* begin to exercise political and economic power, and so on.³⁹ It is important to keep these events in perspective though, for not all of them were necessarily exogenous to monetary developments. In particular, the monetary analysis underlying this paper forces us at least to consider the possibility that various booms in commodity prices were one particularly vivid manifestation of the failure of confidence in the future stability of the U.S. dollar that accompanied the breakdown of the Bretton Woods system.

Commodity prices are set principally in terms of U.S. dollars, and the adoption of floating rates did not change that convention. Moreover, being determined in something very close to continuous auction markets, many of these prices are essentially perfectly flexible. These prices can, therefore, change in response to new information much more rapidly than can the prices of most manufactured goods, not to mention the prices of services and money wages. In this respect, the U.S. dollar prices of commodities may overshoot their long-run equilibrium values in response to new information, not least about the conduct of U.S. policy; such overshooting is essentially the same as that discussed in the section on domestic policies under flexible exchange rates. Therefore, in the early 1970s, inflation emanating from the United States might have been expected to cause the *relative* prices of commodities to rise even in countries pursuing rather tight monetary policies and appreciating their currencies against the U.S. dollar.

Just how such a development ought to have affected different countries depended upon which commodities they consumed and produced and in what amounts. For many countries, not least Canada, the adoption of flexible exchange rates coincided with important “temporary” changes in the terms of trade that, although here interpreted as having a common monetary cause, at the time seemed to be making independent contributions to the instability of the international economy. OPEC must stand somewhat apart from the above diagnosis; in this case, in 1973, a buyer’s cartel lost its power to a seller’s cartel made up of governments and in a strong political position to enforce its pricing policies. Nevertheless, the possibility that the first 1973 oil shock was partly a consequence of past monetary excesses among Western economies — not least the United States — must not be ignored; nor must the fact that the 1979 oil price increase came in the wake of another increase in U.S. money growth, set in motion during the first two years of the Carter administration.⁴⁰

Before the 1970s, many critics of floating exchange rates feared that speculation in foreign exchange markets would render such a system inherently volatile, whereas proponents of floating rates argued that

speculation would be stabilizing because specialist traders capable of making profitable use of all available information would dominate the market and keep exchange rates at or near their equilibrium levels, those levels in turn being determined largely by purchasing power parity considerations. The example of the Canadian exchange rate in the 1950s, as studied, for example, by Poole (1967), or of the German mark during the Weimar hyperinflation, as studied by Frenkel (1976), were cited in support of this latter position. As I have already remarked, the volatility of exchange rates in the 1970s took the proponents of flexible rates by surprise, prompting one of them (Frenkel, 1981a) to write of "the collapse of purchasing power parities" during the decade. However, it is important to be clear about which of these proponents' prior beliefs turned out to be wrong in the light of experience.

It was not so much that the foreign exchange market turned out to be fundamentally unstable in and of itself or highly inefficient in the narrow economic sense of proving unable to assimilate and act upon readily available information.⁴¹ Rather, it was that the supporters of flexible rates had failed to appreciate the capacity of such a system to amplify and transmit internationally instabilities arising elsewhere through the overshooting inherent in the behaviour of any asset market. It is arguable, therefore, that if the floating rate system of the 1970s had been introduced into a world where monetary and fiscal tranquillity reigned and in which stable monetary and fiscal policies would have been pursued thereafter, the system's performance might have borne out the expectations of its proponents.

However, floating was not so much introduced as forced upon the world by pre-existing disequilibria, and in retrospect, it is not surprising that the international monetary system was so lively under floating rates. Nor is it surprising that countries found their monetary independence a good deal less than total after the adoption of floating rates, and their ability to avoid "imported" inflation considerably circumscribed. After all, the explosions in commodity prices already referred to, though perhaps having a monetary origin, *did* involve changes in relative prices, and we have seen that flexible rates cannot insulate a country from relative price changes. Moreover, we have also seen that temporary exchange rate overshooting is to be expected whenever countries are subjected to divergent shocks, not least those imparted by divergent monetary policies, and we have also noted that "temporary" might well denote a period better measured in years than in months.

Canadian experience in the early 1970s provides a particularly good example of both classes of effects at work. Commodity price increases affected not only Canada's external terms of trade, but also the internal terms of trade between the resource sector and manufacturing. Moreover, manufacturing's difficulties were bound to be compounded by any tendency of the Canadian dollar to overappreciate in the face of rising

U.S. inflation. Given a natural and quite understandable concern about unemployment, not to mention the political influence of the manufacturing areas, it is hardly surprising that having floated the dollar in 1970, the Canadian authorities by 1973 were vigorously resisting its further appreciation and, in the process, were importing inflation.⁴²

The Canadian example is an extreme one because not every country was quite as vulnerable to the instability of the U.S. dollar as Canada, and though no one avoided inflation in the 1970s, it is inconceivable that countries like West Germany, Switzerland and, later in the decade, Japan, could have maintained their inflation as far below the world average as they did without floating exchange rates. Their insulating properties were far from perfect, but they were certainly significant even in the face of pressures associated with that other fact about the 1970s that so surprised advocates of flexible rates, namely, that countries continued to hold and use foreign exchange reserves after the adoption of flexible rates.

The idea that with no requirement to support the exchange rate, central banks would carry no foreign exchange reserves was widely held before 1971 and indeed is built into many theoretical models of the operations of flexible rates. Taken literally, these models suggest that with the adoption of flexible rates, the international monetary system can be reduced to nothing more than a series of national systems. However, as I have already stressed, under floating rates, goods and assets still get traded across national boundaries, and international units of account and means of exchange are still required. Moreover, the floating rate system of the 1970s did not come into being *ab initio* but grew piecemeal out of the wreckage of the preceding fixed rate system. Part of that wreckage was an existing stock of international reserve assets. Just as the removal of sterling from an important role in the international monetary system by the combined effects of the Depression and World War II left an overhang of sterling balances, so did the collapse of the Bretton Woods system leave a dollar overhang.⁴³

The residual role of gold in the international monetary system effectively ended with the collapse, in 1972, of the 1971 Smithsonian Agreement even though much gold remained and remains in central bank and IMF stocks as an asset of uncertain liquidity and unstable value. The international monetary role of the U.S. dollar, however, did not cease in 1972, and it was natural that central banks would find it convenient to continue to hold inventories of liquid dollar assets. Moreover, though a central bank could control its domestic money supply by open market operations in domestic securities in a world without foreign exchange reserves, the existence of reserves in the real world of the 1970s provided central banks with a choice of markets of intervention. Given imperfect substitutability between domestic and foreign securities in capital markets, that choice also offered central banks the possibility of some

limited and perhaps short-term control over the value of the exchange rate and the domestic interest rate for any given value of the money supply.⁴⁴

Reasons, which I have already discussed, existed for foreign exchange market intervention after the formal adoption of floating rates, and the political significance of domestic interest rates is obvious. It ought not to be surprising, therefore, that central banks availed themselves of the opportunities presented by the pre-existing stock of foreign exchange reserves and continued to use them. It should be noted explicitly, though, that the evidence presented by Boothe and Longworth (1984) on the high degree of capital mobility between this country and the rest of the world suggests that such arguments as these can be of only limited relevance in the specific case of Canada.

The composition of foreign exchange reserves began to change in the 1970s as the boundary between official liabilities and short-term private capital began to shift. Although the liabilities of certain apparently secure private borrowers, such as U.S. commercial banks, were potentially available for use as reserves in the 1960s, these liabilities came to play a much more important role in the 1970s and 1980s. The commodity price boom and, in particular, the increase in the price of oil from 1973 onward generated large and persistent trade imbalances in the world economy. These imbalances were matched by a desire on the part of surplus countries to hold a significant fraction of their growing wealth in marketable forms. The official short-term liabilities of (trade) deficit countries were available directly to absorb this demand in part, but it was met in much larger part by the expansion of the liabilities of private commercial banks. This borrowing was offset by lending to trade deficit countries, notably, but by no means exclusively, those of the Eastern bloc and of the Third World, many of which had been particularly hard hit by oil price increases and whose official liabilities did not have a ready international market.⁴⁵

This recycling had a number of important implications for how the international monetary system developed in the 1970s. First, liabilities of private commercial banks came to play a reserve role in the international monetary system such as had largely been filled under the Bretton Woods system by official U.S. liabilities. Second, the ultimate security of those newly created “reserves” rested upon the continuing willingness, not to mention ability of a number of governments — notably, in Eastern Europe and South America — to meet their obligations. The security of the international banking system, upon which stable economic relations among the advanced economies and the market economies of Southeast Asia relied, became to a degree dependent upon the ability of the non-market economies of the world to service their debts. Finally, because these countries’ liabilities were typically denominated in U.S. dollars and were relatively short-term, these countries’

ability to support their debts came to rely in good measure upon the conduct of monetary policy in the United States, a factor over which neither the ultimate debtors nor creditors involved had any control.

With the benefit of hindsight, it is not hard to see how these developments contributed to a growing fragility of the international banking system and hence of the international monetary mechanism and how these developments lent a critical international dimension to the consequences of the Reagan administration's attempts to restore domestic monetary stability to the United States, a dimension not at first clearly perceived. This is not to absolve the governments of debtor countries of any responsibility for their own plight. Had the proceeds of their borrowing been used to finance investment designed to diversify and improve the international competitiveness of their export sectors, their problems would have been less severe. All too often, however, these proceeds went instead to shore up existing industries that might better have been allowed to contract or to cover public sector deficits. Nor are the commercial banks blameless for their naive belief that so-called sovereign risks were nevertheless essentially riskless: had these banks been less willing to act as intermediaries in the international short-term capital market, the market would not have grown in the dangerous way it did.⁴⁶

The key fact remains that under the flexible exchange rate regime of the 1970s, the world financial system continued to develop in a manner that gave an increasingly important international dimension to U.S. monetary policy. Simultaneously, the rules of the game of the system seemed to make it possible for U.S. authorities to conduct their policy with purely domestic ends in view. I say "increasingly important" deliberately, because under Bretton Woods, where international reserves were almost entirely official liabilities of one sort or another, it had been possible to treat the maintenance of a smoothly functioning international monetary system and the provision of loans to less developed and Eastern bloc countries as separate issues (despite the proposals heard from time to time in the 1960s to create SDR-like assets by allocating them initially as foreign aid). It was the activities of private banks in recycling OPEC surpluses that unintentionally led to these two matters being brought together in such a way as to render an important aspect of so-called North-South (but also East-West) relationships directly vulnerable to the conduct of U.S. monetary policy for the first time.

The consequences of this vulnerability are well known. The onset of systematically tight money in the United States in 1980, aimed at reducing U.S. inflation, produced high domestic interest rates and an associated dramatic appreciation of the U.S. dollar on foreign exchange markets. That policy also generated a severe domestic recession that was transmitted to other industrialized countries not only because U.S. demand for their exports fell, but also because those countries tried to

resist the U.S. dollar's appreciation by raising their own domestic interest rates. In turn, not just oil and commodity markets, but the export markets in general of debtor countries were weakened so that their financial problems were compounded. By 1982, an international debt crisis was at hand, and it is hard to see at the time of writing what the precise outcome of this crisis will be. Suffice it to note that in principle, the problems of indebtedness and of the maintenance of the international monetary system are logically independent of each other and ought to be tackled separately. There are many more ways of maintaining the solvency of the banking system and the continued viability of the monetary system than forcing the repayment of existing debts. Provided central banks in advanced countries are willing to guarantee the liabilities of private sector banks, there is no reason why even a series of defaults by debtor nations should lead to a monetary collapse. I shall take it as my task for the balance of this paper to outline lessons that can be drawn from the 1970s for the debate about reform of the international monetary system, which the 1980s and 1990s are bound to bring. Only passing reference will be made to the issue of international indebtedness.

The Question of International Monetary Reform

The history of the international monetary system in the past decade has been much more turbulent than advocates of flexible exchange rates would have predicted before the fact, but it would be misleading to write off the experiment with flexible exchange rates as a failure. They have clearly permitted a much wider divergence among domestic inflation rates than would have been possible in their absence: here one very simple, but important prediction about such a regime's properties has been confirmed by experience. Moreover, monetary economists have learned and are continuing to learn new things from the experience with floating rates.

The analyses of overshooting and of the role of currency substitution in the system discussed in this paper were prompted by recent experience, and they enable us to argue that exchange rate volatility in the past decade has arisen mainly from the regime's capacity for amplifying shocks originating elsewhere in the system. Here one must not lose sight of three simple propositions. First, without shocks to be amplified, there would have been no exchange rate volatility. Second, it is arguable that the shocks in question in very large measure originated in national policies. Third, those shocks could not have been absorbed by the world economy under a regime of fixed exchange rates without immediate and extensive resort by national governments to direct intervention in international goods and capital markets by way of tariffs, quotas, "voluntary" trade limitations, exchange controls, and so on. In the light of these propositions, advocates of flexible exchange rates can make a

strong case that during the past decade, the great achievement of the flexible exchange rate regime has been to permit the international monetary system to function despite national policies and in the process to enable trade in goods, services, and capital to continue to flourish.⁴⁷ Stated so boldly, this conclusion is too optimistic. It is true that world trade continued to grow in the 1970s, apparently unhindered by exchange rate fluctuations, and that international capital flows were on an unprecedented scale, but it is also true that the experience of the past two or three years casts doubt upon the permanence of these trends.

The tightening of U.S. monetary policy after 1980 caused an overshooting of that currency and of the Canadian dollar, which was de facto pegged to it, relative to the Japanese yen and to European currencies. In turn, that overshooting has been associated with a build-up of protectionist pressures, particularly in North America. Once created, those pressures seem unlikely to disappear when their immediate cause is removed. Overshooting has also been associated with a failure of North American export industries to expand their overseas investment in marketing organizations to the extent that they otherwise would, with a corresponding overexpansion by importers, whence the protectionist pressures already mentioned. Thus, the pattern of world trade may well have been distorted and its volume shrunk in a long-lasting way as a result of the monetary environment. As to capital markets, the ongoing international debt crisis demonstrates for all to see that recycling was not the unqualified success people were claiming it to have been even a couple of years ago. Nevertheless, as far as capital mobility among market economies is concerned, there is no sign that the system has failed in any way. Southeast Asian economies, such as that of South Korea, have borrowed heavily and are not in trouble. It is in the area of providing economic links between more market-oriented and less market-oriented economies that the system has been less successful.

Whatever the source of the current debt crisis, however, no one would be very surprised if its effects on future patterns of borrowing and lending turned out to be severely contractionary, and so the system may not, after all, have coped quite as successfully with the stresses placed upon it as it seemed at first to have done. But this does not mean that any other conceivable set of arrangements could have coped better; it simply means that monetary disturbances have real consequences of lasting importance and that though a flexible exchange rate regime can mitigate and delay the onset of those consequences, it cannot ultimately prevent them. That is hardly a new lesson.

Now to say that the volatility of the international monetary system over the past ten years has in good measure been a result of the volatility of domestic monetary policies in various countries is not to attribute any ultimate causal significance to monetary policy. In contemporary economies, the instability of monetary policy is usually a manifestation of

deeper political problems.⁴⁸ Nevertheless, to return to a point made at the outset of this paper, that political power in the modern world resides at the level of the nation state does imply that it is the policies of nation states which must be changed if monetary stability is to be restored and maintained in the international economy. Proposals for reform which ignore this point and seek to create stability in the world economy by overhauling international monetary institutions are therefore deeply flawed. Such proposals seek to treat the most obvious symptoms of monetary instability but leave its causes untouched. Proposals such as those of Kemp and Mundell (1983) to put the international monetary system back onto some kind of gold standard are particularly vulnerable to criticism on this point.

The gold standard is the archetype of commodity-based fixed exchange rate systems, and it worked reasonably well in the years before World War I, when governments by and large took it for granted that their role in economic life was, by modern standards, a very limited one. Precisely because the economic role of the state was limited, acceptance of the monetary discipline imposed by the gold standard did not usually present politicians with difficult choices. When difficult choices did turn up, however, the discipline exerted by the gold standard was never absolute; in particular, when the exigencies of war forced governments into assuming a wider economic role, the gold standard often gave way.⁴⁹ As the political climate slowly became more favourable to government intervention in economic life and as the economic role of the state grew, particularly after World War I, gold convertibility began to be treated as an object of political choice and hence debate, rather than as a binding constraint upon policy to be observed unquestionably by all concerned. Once it became possible to debate the desirability or otherwise of maintaining gold convertibility in particular circumstances, the gold standard ceased — even before its formal abandonment — to be a source of overriding discipline in the conduct of policy. The change in status of the maintenance of gold convertibility from an unquestioned principle of policy to an object of political debate and choice was thus a more important event than its ultimate abandonment.

The adoption now of a commodity standard for the international monetary system would certainly force domestic monetary policies to become disciplined, but it is precisely because this fact is well understood that proposals to set up such a standard are regarded by many (including this author) as beside the point. Political authorities who would be willing to accept such discipline do not, as that willingness demonstrates, need it, whereas those whose conduct might benefit from such discipline would not accept it in the first place. Discipline in the conduct of domestic monetary policy is undoubtedly desirable, not least because of the benefits discipline would bring to the international economy, but in the world we live in, such discipline must be generated and

enforced through the political processes of individual nation states. It cannot be imposed upon those nation states by international arrangements not backed up by genuine political power. Such arguments as these are relevant not only to proposals for the introduction of some sort of commodity convertibility as a basis for the international monetary system, but also to other plans for the re-introduction, by way of international agreement, of fixed exchange rates based, say, on the SDR or some other paper asset rather than a commodity.

Experience with the European Monetary System (EMS) illustrates the practical relevance of the above arguments and the difficulty of reaching any conclusion about their empirical validity. Under this system, the exchange rates of member currencies are normally supposed to move within rather narrow bounds in response to market forces. Larger movements are supposed to be rare, taking place only in response to disequilibria judged too large to be safely corrected by domestic policies and then only by agreement among member countries. The system, which has created its own international means of exchange and unit of account, the ECU, was superimposed on an already existing set of supranational economic arrangements, the European Economic Community.⁵⁰ At the time of the system's inception, though skepticism was expressed in some quarters — notably in the United Kingdom, which did not join — it was difficult to discount entirely the plausibility of the claims of supporters that the system's very creation would, in and of itself, provide an incentive toward policy coordination among member states. Early experience with the system supports the skeptics' position. Policy coordination among member countries did not improve after its creation, as the repeated and serious difficulties encountered by the French franc and the Italian lira in particular show. However, the system did provide a framework within which parity changes among European currencies could be managed in an orderly way, and its supporters also claim that the Mitterand government's reversal of its inflationary policies in 1983 marks the beginning of a move to better policy coordination within the system than has ruled in the past. On the other hand, skeptics might still argue that domestic political discipline generated by the manifest failure of those policies to deliver high employment and inflation — free growth had much more to do with their abandonment than any external discipline imposed by the EMS.

Whatever one's judgment on the EMS, it would be a mistake to jump to the conclusion that the international monetary experience of the 1970s will inevitably be repeated in the 1980s and 1990s. It was not just the international economy that was disrupted by monetary instability of the 1970s. Domestic economies, too, have suffered, and the past five years in particular have seen a transformation in the general public's understanding of the sources of monetary instability and willingness to support policies designed to drive instability from the system. The disinflation-

ary policies of the past few years have been just as much a product of political processes as were the inflationary policies that preceded them.⁵¹ Though it would be rash to predict with any degree of confidence that the domestic policies of the countries of the Western world will be responsibly executed in the next ten or twenty years, there seems more prospect of this now than one could have dared hope for even five years ago.

If domestic policies in a number of important countries do indeed turn out to be more stable in the 1980s and 1990s than they have been in the recent past, so will exchange rates among their currencies, with or without the intervention of explicit institutional reform. The international economy will then be well on its way to evolving a "new Bretton Woods system," which, being based upon stable domestic policies whose coordination stems from harmony among domestic political processes, will be viable. The reserve currency of such a system, the role of the IMF in the system, the extent to which exchange rates might formally be fixed under such a system, and so on, are impossible to predict. However, even now, after nearly two decades of instability, the U.S. dollar remains by far the most widely used international money, and it is therefore hard to believe that it would not play a key role in such a system. As under the old Bretton Woods, so under the new, if it comes into being, the continuing stability of the international economy will be heavily dependent upon the "good behaviour" of the U.S. monetary authorities.

The weakness of the foregoing argument is that "good behaviour" on the part of the U.S. monetary authorities cannot be relied upon. I hasten to add that in saying this, I do not intend to attribute any special weakness to the political system in the United States or any extraordinary degree of political and economic irresponsibility to U.S. leaders. I have already stressed that we must look to political processes to produce the policies upon which international monetary stability must depend and that in a world of nation states, these political processes are likely to be driven by largely domestic concerns. It does not reflect badly on the United States to say that this is as true of their political processes as it is of, say, Canada's. Nevertheless, it is the case that U.S. economic policies have altogether more important international consequences than do those of other countries, both because of the sheer size of the U.S. economy and because of the critical international status of the U.S. dollar. It is arguable that the political organization of the Western world is flawed to the extent that many people directly affected by U.S. policies must rely upon either American goodwill or a fortunate coincidence of interests for the promotion of their economic well-being, but it would take us far beyond the scope of this paper to consider this matter. Rather, I would note that the governments of countries other than the United States do have at their disposal certain limited means of insu-

lating their economies from U.S. policies, not least in the choice of exchange rate arrangements.

The salient point about current U.S. policy is that without either a major increase in taxes or a significant cut in expenditures in the near future, the federal deficit is going to put greater and greater pressure upon the domestic and indeed upon the world financial system. This fact must be borne in mind by policy makers in other countries, not least Canada, as they lay their plans for the next decade. If the U.S. federal government does regain control of its budget in the next year or so and hence is able to consolidate recent gains against inflation, the task of Canadian policy makers will be relatively simple on the monetary and exchange rate front. Provided Canada pursues responsible policies of moderate monetary growth, Canada's exchange rate on the U.S. dollar will be well-behaved whether conscious attempts are made to peg that exchange rate or not. The monetary environment for Canada will be very much like that of the 1950s, and the choice of whether to run a fixed or flexible exchange rate on the U.S. dollar will be an issue of secondary importance.⁵² On the other hand, if the U.S. federal deficit persists and is indeed the serious problem I believe it to be, Canada is in for a difficult time regardless of how that deficit is financed.

It is at least logically possible that the United States will be able to sustain relatively low monetary growth rates while continuing to run a large deficit. However, in this case, it is hard to see how real interest rates both in the United States and in the world in general can fail to remain at levels high enough to inhibit investment. It is unlikely that monetary and exchange rate policy could do very much to stave off the consequences for Canada of a continuing U.S. deficit. A high real interest rate abroad is after all a real factor whose long-run influence on Canada ought to be the same regardless of the exchange rate regime. Although I have noted that less than perfect substitutability between domestic and foreign assets confers upon the authorities of an open economy the ability to trade off domestic interest rate and exchange rate values, the degree of substitutability between such assets increases with the passage of time; so most of the advantages a flexible rate regime might confer in this case are temporary.⁵³

Nevertheless, even partial and temporary protection against high real interest rates is worth having, not least because it is far from clear that the United States will be able politically to sustain indefinitely a combination of fiscal ease and monetary restraint. If the United States cannot do so, a bout of renewed monetary expansion and hence inflation there becomes a distinct possibility. If, in the face of renewed inflation in the United States, the same degree of priority is given by Canadian policy makers to maintaining the U.S. dollar price of the Canadian dollar as was given in the early 1970s, a repeat of the economic history of 1970–76, on a more dramatic scale, would be a virtual certainty. On the

other hand, if the authorities were, in such circumstances, willing to allow the exchange rate to appreciate and to face the short-term, but possibly painful terms of trade consequences that would be produced by overshooting, policy makers would at least be able to avoid a resurgence of inflation in Canada and the recession that would eventually be needed to remove it from the system.

What all this implies for Canadian policy toward the exchange rate over the next few years is straightforward. One can envisage situations in which the choice between a formally fixed and a formally flexible exchange rate regime is of minor importance; situations in which the choice of a flexible rate might give the authorities valuable, albeit short-term room to manoeuvre; and situations in which important long-term advantages are to be had from a flexible rate. There seem no circumstances in which, from the point of view of domestic policy, there are any advantages from fixed rates. Nor is there any reason to believe that the adoption by Canada of a fixed rate of exchange on any currency would hasten the establishment of a fixed rate international monetary system, which, from the viewpoint of the world economy, might be considered by some as preferable to a system of multilateral flexible rates. The case for Canada's conducting monetary policy with a view to achieving domestic ends and letting the exchange rate take care of itself would therefore seem a strong one.

Notes

This study was completed in June 1984.

I am grateful to Cillian Ryan for research and bibliographic assistance and to Clarence Barber, Pierre Fortin, David Longworth, John Sargent, Michael Parkin, George Zis, and two anonymous referees for comments on earlier drafts. None of the above is implicated in any of the views I express.

1. For pioneering expositions of the monetary approach see, for example, Courchene (1970), Mundell (1971), and Johnson (1972a).
2. In such a world as this, one money is clearly more efficient than multiple monies. It avoids the transaction costs that agents would have to undertake in moving between one money and another.

It will suffice if the reader of this paper thinks of money as consisting of those assets that are readily transferable as means of exchange (currency and chequable bank deposits in the context of Canada). The precise specification of money for empirical purposes is a difficult and controversial matter, which I have discussed in Laidler (1985). Sparks (1985) deals with these issues in the context of Canadian policy problems.

3. The literature on the demand for money function requires a survey article in its own right to do it justice. In particular, the issue of stability is contentious. My own view is that institutional change has, over the past decade, led to certain shifts in the function. However, I believe that it is a defensible proposition that far and away the greatest part of the stability problem over this period has arisen from our inability to model properly the dynamics of the adjustment processes underlying so-called short-run demand for money functions. This matter has been ably surveyed in the context of the United States by Judd and Scadding (1982), but as far as I know, there is no similar, easily accessible survey of the Canadian evidence.

It should be noted that the stability of national demand for money functions is

neither necessary nor sufficient for the existence of a stable world demand function. Unstable demand shifts at the national level can cancel out upon aggregation, while differences in the structure of national demand functions can render their aggregation impossible. Hence the proposition that there exists a world demand function for money must be tested directly. For an early and largely successful test, see Gray, Ward, and Zis (1976). For a general overview of theoretical, econometric, and empirical issues bearing on the stability of the demand for money function, see Laidler (1985).

4. The reader should note that the distinction between non-tradable and tradable goods is not the same as that between export and import goods on the one hand and those produced for domestic consumption on the other. It is the physical possibility of a good's being traded at a reasonable transaction cost, not the good's crossing a national boundary, that determines whether or not it should be classified as a tradable.
5. Strictly speaking, this definition is appropriate only when the rate of growth of the world money supply is zero. With nominal money growth, equilibrium would involve each country's running a surplus with the world monetary authority big enough to keep its own domestic money supply growing at the rate of inflation.
6. I beg here the issue of what plays the role of the international money. This matter is discussed later in the specific context of the Bretton Woods system.
7. This is an important issue in the context of the breakdown of the Bretton Woods system and will be discussed in that context. Early work on the monetary approach to balance-of-payments analysis took it for granted that such insulation was impossible. However, see Parkin (1974) and Laidler (1975) for early theoretical exercises in which this overly restrictive assumption was relaxed.
8. Important Scandinavian papers on this issue include Aukrust (1970) and Edgren, Faxen and Ohdner (1969).

It might be noted that the analysis here sets aside the possibility that the terms of trade within the tradables sector between export goods and import goods might change. This is a potentially important qualification to be borne in mind in the case of Canada and is addressed later in appropriate contexts.

9. Darby and Lothian (1983) have paid careful attention to the question of the possibility of sterilization under the Bretton Woods system. Their work shows that beyond any reasonable doubt, sterilization was possible over periods of a few quarters under the Bretton Woods system, but not over longer periods. Their work also shows that governments frequently resorted to sterilization in the 1950s and 1960s. See Darby and Lothian (1983, chaps. 10–11). Of course, it should go without saying that even with less than perfect capital mobility, it is easier to sterilize the monetary effects of a balance-of-payments surplus than those of a deficit. Reserves are finite.
10. Many of the early exercises carried out by proponents of the monetary approach to balance of payments and exchange rate analysis considered only monetary shocks. Several critics of the approach, for example, Chipman (1980), have — somewhat unfairly I believe — inferred from this work that those proponents believed the balance of payments to be unaffected by real variables.
11. The origins of the Mundell-Fleming model are to be found in Fleming (1962) and Mundell (1963). The model is essentially a version of the standard textbook IS–LM model and has by now become a fixture in the literature of international monetary economics. One potential weakness of this model is that it analyzes the capital account in purely flow terms. However, Boyer (1978a), for example, has shown that its main results on the relative effectiveness of monetary and fiscal policy under different exchange rate regimes continue to hold even when capital movements are explicitly analyzed in portfolio balance terms with careful attention being paid to stock-flow distinctions and wealth effects.
12. There is, of course, an extensive literature on the extent to which government debt is and is not net wealth and the extent to which bond-financed and tax-financed fiscal policy are equivalent to each other. Seminal papers include that of Barro (1974), which develops the rather extreme conditions under which debt and tax finance are equivalent in a closed economy.

13. The reader will note that the Mundell-Fleming results arise because in that model, the question of endogenous variations in agents' expectations about prices in response to policy changes does not arise.
14. Of course, it is always logically possible that wage and price controls combined with exchange controls and a rigorously enforced system of import quotas could influence inflation. This is essentially the policy prescription of the so-called New Cambridge school for the United Kingdom. See, for example, Cripps and Godley (1976). This is not the place to discuss the feasibility of such policies in a democratic society.
15. To say, however, that there exists a stable demand for money function at the level of the national economy does not rule out the possibility that there might be some demand for a particular national money elsewhere in the world that might itself be subject to unpredictable fluctuations. It is precisely this matter that underlies the analysis of currency substitution. I shall discuss this later.
16. Chipman (1980) offers an elaborate theoretical analysis of the possibilities here.
17. I argued this particular point in Laidler (1979). Purvis (1979b) argued quite correctly that the conditions under which a currency depreciation alone would enable all necessary adjustments to take place were very special indeed. Purvis (1979a) contains a rather elaborate analysis of this and related issues.
18. This vicious-circle argument has been elaborated by Claassen (1976), among others. It is, of course, not the case that money-wage behaviour must necessarily respond always and everywhere to prices. Where relativities are important, it might be argued that specific wage bargains will be conditioned to the general behaviour of money wages elsewhere in the economy. Fortin and Newton (1981) have argued that this is the case in Canada, and if they are correct, the vicious-circle argument is of relatively little relevance to Canadian experience.
19. The classic articles on the short-run nature of the inflation-unemployment tradeoff are those of Phelps (1967) and Friedman (1968). See Sumner (1976) for an early and thorough development of the implications of the Phelps-Friedman insight in the context of the debate on fixed versus flexible exchange rates.
20. The literature of the 1950s and 1960s took it for granted, usually implicitly, that the inflation rate ruling in the rest of the world was very stable. This assumption reflected the facts of U.S. inflation in the 1950s and early 1960s. As the U.S. economy became more and more inflation prone, so the emphasis on the permissive nature of flexible exchange rates vis-à-vis the choice of the domestic inflation rate changed.
21. The overshooting argument is a special case of a rather more general point about the insulating properties of flexible exchange rates that has been made by Turnovsky (1979), among others. To the extent that a monetary change anywhere in the world has even short-run real effects on interest rates or output and employment, these effects will in turn have real consequences for domestic variables in a flexible exchange rate economy. Just what these effects will be depends upon the degree of price flexibility in the economy and the extent to which agents within it have access to information about what is going on in the rest of the world and are able to make full use of this information in their market transactions. For a theoretical analysis of this latter issue, see Burton (1980).
22. The so-called buffer-stock approach to monetary analysis also yields an overshooting prediction. Buffer-stock analysis permits excess demands for and supplies of money to arise and persist over time and has them affect expenditure flows. In particular, under a flexible exchange rate, the approach would have it that an excess demand for domestic money would drive the exchange rate above its long-run equilibrium level. For an empirical application of this idea to Canadian data, see Laidler et al. (1983). This analysis gives some, albeit modest, support to the buffer-stock notion and its implications for the balance of payments and exchange rate behaviour.
23. In recent Canadian experience, the main argument of the Bank of Canada for intervening in the foreign exchange market has been that left to itself, the Canadian dollar might overdepreciate in the face of pressures originating in U.S. monetary policy and might in the process set up adverse expectations about the future time path of Canadian inflation among the Canadian labour force. Since the textbook-style overshooting

analysis of Dornbusch depends upon agents having correct expectations of the future time path of domestic prices, one cannot simultaneously explain the behaviour of the Canadian exchange rate in terms of that analysis and defend the above justification for intervention in the foreign exchange market. It does not, of course, follow that the Bank of Canada's reading of agents' expectations has been in error. It could just as easily be that the textbook overshooting model does not capture certain important real-world phenomena. However, the Bank of Canada's argument is a version of the vicious-circle arguments discussed earlier, and the evidence of Fortin and Newton (1981) does not support the Bank's position.

24. The reader will note that this prediction is directly opposed to traditional views, which would have it that a control scheme that lowered costs would improve the balance of payments and hence appreciate the domestic currency. The difference here arises from paying attention to the interaction of the demand for and supply of money and making specific assumptions about monetary policy.
25. Ronald McKinnon, in particular, has been a strong advocate of taking seriously the fact that national currencies play a specifically international role. See, for example, McKinnon (1979, 1982). For a survey of the issues and evidence involved in the currency substitution debate, see Spinelli (1983).
26. This extreme view may be found expressed most forcefully by Karekan and Wallace (1978). For a thorough critique of their oversimplified analysis, see Haberler (1981), pp. 42–46.
27. This simple “monetary” theory of the exchange rate was extensively tested during the 1970s and, of course, failed very badly. On all this, see, for example, Frenkel (1981a, 1981b). Monetary economists really ought to have known before the event that this simple model would not hold up well. Although it is true that Frenkel's work on the Weimar hyperinflation (Frenkel, 1976) showed that the model was not without empirical content, it has long been known that that episode was one in which all shocks to the system were tiny relative to the monetary shock and that results derived from that episode might not generalize. Moreover, it was also known before the event that purchasing power parity, to the extent that it has empirical content, works better on something like decade-long averages of data than over any shorter period. On this, see, for example, Galliot (1970) and Myhrman (1976).
28. Arguments such as those of Hayek (1978), that the provision of money could be left to the unregulated private sector, rest upon ideas such as we are discussing here. The difficulty is that although competitive money would certainly be predictable in purchasing power and yield a competitive return, at least in theory, there seems nothing in the competitive mechanism that would stabilize the price level. In competitive models, any rate of inflation, provided it is fully anticipated, is as good as any other. This appears not to be the case in the real world.
29. Of course, *fundamental* is not easy to define. In practice, it came to refer to a state of affairs in which, to correct a balance of payments problem, a country would have had to engage in a degree of domestic deflation that would have had serious effects on domestic income and employment. Under Bretton Woods, in practice, exchange rate realignments were few and far between. The sterling devaluation of 1967 was one of the more important ones, as was the rapid decline of the Canadian dollar in 1961, which was brought to an end by the pegging of the Canadian exchange rate in that year. The French currency reform of 1959 was accompanied by a devaluation, and there was a small realignment of European currencies in 1961.
30. The view of the Royal Commission on Banking and Finance, or the Porter Commission (Canada, 1964), that the differences between a fixed and a flexible exchange rate regime for Canada were rather minor, with the emphasis being on the different nature of the signals that the regime gave to the domestic authorities about the appropriateness of their policies, is strong evidence in favour of the proposition that until the devaluation that marked its end, the Canadian float of 1950–62 really amounted to little more than a widening of the interval in which an otherwise pegged rate was allowed to fluctuate. Empirical work by Caves and Feige (1976) confirms that Canadian monetary policy was responsive to the exchange rate during this floating period, thus suggesting that there was indeed a target value for the exchange rate.

31. The SDR (Special Drawing Rights) is an IMF liability whose value is pegged against a basket of representative currencies. It has been issued in limited amounts since 1970, when it was intended to provide an alternative internationally tradable liquid asset to the U.S. dollar and gold. The SDR is in some respects similar to Keynes's Bancor concept, but it is far from being a key reserve currency in an international monetary system.
32. The acid test here is whether or not U.S. monetary policy during the 1950s and 1960s was conducted with a view to maintaining some link between the quantity of money in circulation in the United States and U.S. holdings of gold. Darby and Lothian (1983, chap. 16), have studied this matter with great care and found no such link.
33. The concept of world liquidity is a difficult one. In theory at least, any quantity of nominal international assets is adequate for providing for liquidity because the price of those assets in terms of goods may change. In practice, under Bretton Woods, the problem was to meet the demands of various member nations for international reserves without putting downward pressure on the world price level. For a survey of the extensive literature on this issue that grew up in the 1950s and 1960s, see Williamson (1973).
34. It is important to note that U.S. monetary expansion did begin to increase before the Vietnam War became a serious matter. However, war finance had a good deal to do with the later acceleration of monetary expansion. It is clearly simplistic to blame the Vietnam War alone for the inflation of the 1960s, but it is yet more simplistic to ignore the war altogether and blame "Keynesian" policies. Darby and Lothian (1983, chap. 16), provided evidence of the steady growth in the U.S. rate of monetary expansion during the 1960s and early 1970s, and its role in generating worldwide inflation is the subject matter of their whole book, as its title indicates.
35. Note, however, that Parkin, Richards, and Zis (1975) and Swoboda (1973) provided early analyses of the role of U.S. monetary expansion in fuelling world inflation that have, in all their essential outlines, been borne out by the detailed work of Darby and Lothian (1983). For a dissenting view on this, see Feige and Johannes (1982). Note, though, that the time series tests for causality conducted by Feige and Johannes did not permit them to reject the hypothesis that world inflation was largely a result of U.S. monetary expansion. Their tests simply did not enable them to reject the alternative, "no causation" hypothesis.
36. On this evidence, see, for example, Hamburger (1977).
37. In the case of Canada, under a flexible exchange rate, upward pressure on the exchange rate took the place of a balance-of-payments surplus as an indicator that domestic policy could become more expansionary, and vice versa.
38. For more detailed accounts of this period, see Argy (1981, chap. 6), and Williamson (1977, chaps. 2–3).
39. On the role of all these matters in generating inflation in the early 1970s, see McCracken et al. (1977). As I have already remarked, I believe that McCracken et al. pay insufficient attention to the role of earlier monetary policy in generating inflation in the 1970s. This is not to deny that bad harvests and price explosions caused relative price changes — they did. See above for a discussion of some of the theoretical issues involved in relative price changes under flexible exchange rates.
40. The argument of this paragraph is very different from that advanced by McCracken et al. (1977), who took it for granted that such commodity price explosions as I discuss were exogenous events. As far as I am aware, the careful empirical work that would settle the disagreement implicit here remains to be done. However, Darby and Lothian (1983, chap. 8), explicitly investigated the contribution made by OPEC to world inflation in the 1970s, with inconclusive results. McKinnon (1983) is one source of the suggestion that oil prices should be regarded as being at least partially endogenous with respect to U.S. monetary policy.
41. There has been a great deal of empirical work on the efficiency of the foreign exchange market. Some studies, such as that of Boothe (1983), find evidence that suggests that the market is not entirely efficient. There do appear to be runs of data in which knowledge of past errors in the forward rate as a forecaster of the spot rate would have

enabled agents to speculate profitably. The difficulty with this line of reasoning is that if there existed, at the time the data were generated, some probability of the occurrence of a particular event that might in its turn have affected the exchange rate, the market would be perhaps efficient *ex ante* even though it gave the appearance *ex post* of being inefficient. On this matter, see Friedman and Schwartz (1982, pp. 556–57).

42. The *locus classicus* for the analysis of Canadian monetary policy in the 1970s is Courchene (1977).
43. The Radcliffe Report (Committee on the Working of the Monetary System, 1959) paid considerable attention to the problem of the sterling balances.
44. Williamson (1976) was one of the first to analyze the continued use of reserves under floating rates.
45. Not all borrowing nations were without oil. The cases of Mexico, Nigeria, and Venezuela come to mind here.
46. For a more detailed account of these developments, see Helleiner et al. (1983).
47. Balassa (1980) provided convincing evidence that at least before the late 1970s, flexible exchange rates and their associated exchange rate fluctuations did not interfere with the growth of world trade.
48. The work of Assar Lindbeck (1976) on the “political business cycle” ought to be cited in this context. However, Alt and Chrystal (1983) argued forcefully that the political business cycle is, at best, a transitory phenomenon.
49. Britain suspended the gold standard in 1797 and did not restore it until several years after the Napoleonic wars had ended. The United States fought the Civil War on a paper currency, and, of course, most countries abandoned gold during World War I.
50. The European Monetary System was much less ambitious, at least in its immediate scope, than the so-called Werner Plan, which envisaged complete European monetary union. Nevertheless, some of the supporters of the European Monetary System did see it as a first step toward more complete union. For an ingenious proposal for achieving European monetary union with an indexed money, see the “All Saints Day Manifesto,” published in Fratianni and Peters (1978), along with a useful collection of essays debating the merits of a European currency.
51. Here one might cite the electoral success of the Thatcher government in Britain and the recent tendency on the part of the Mitterand government in France to reverse its policies. Moreover, there is a good deal more support for anti-inflationary policies in Canada now than there was even five years ago. I offer no predictions about how durable the commitment to anti-inflation policies on the part of the electorate will be in the long run, either here or elsewhere.
52. I do not, in this paper, take up the issues of choosing a monetary aggregate to control, measuring it, and monitoring it so that institutional change does not undermine the conduct of monetary policy. These are all serious issues and that I believe them solvable does not mean that they do not require a good deal of attention. See Sparks (1985) for a discussion in the context of Canadian policy.
53. Such temporary relief is not available under a fixed rate because pegging the price of domestic currency in terms of foreign currency removes from the authorities the ability to choose in which market to intervene in order to change the money supply. On this matter, see above.

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International Asset Substitutability: *A Summary of Research*

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Introduction

This report summarizes the research undertaken for our 1985 study titled *International Asset Substitutability: Theory and Evidence for Canada*. That research had two objectives: first, to establish the areas in which the efficacy of monetary, fiscal and foreign exchange market intervention policy under flexible exchange rates is affected by the degree of international substitutability among financial and real assets; and second, to determine from the available empirical evidence the degree of substitutability for Canadian assets and the resulting policy implications.

The investigation was not restricted to one theoretical model. The empirical evidence surveyed was taken from estimates of various models, which are listed in the following section.

Our findings were fully consistent with the popular perception that the financial markets of Canada and the United States are closely integrated. The empirical results suggested that the mobility of capital across the Canada–U.S. border is high and that Canadian dollar and U.S. dollar assets are perceived to be close substitutes for one another. Indeed, except over the very short run, it is difficult to reject empirically the hypothesis that short-term Canadian and U.S. financial assets are highly, if not perfectly, substitutable.

What is to be understood when we speak of *high mobility* and *high substitutability*?

By definition, high mobility means that comparable domestic and foreign instruments covered in the foreign exchange market are close to perfect substitutes, and there is no premium for differential political risk

(i.e., risk of capital controls or default). High substitutability, in contrast, means that the market pays no premium for exchange rate risk on domestic and comparable uncovered foreign instruments. Any forward premium or discount would be equal to the expected increase or decrease in the price of foreign exchange.

A high degree of substitutability of financial assets has important implications for the conduct of monetary, fiscal and foreign exchange market intervention policy in a flexible exchange rate regime. In particular, the short-run effects of monetary policy on output and prices under flexible exchange rates are heightened, while the effects of fiscal and intervention policy are moderated. For the longer run, the empirical results indicated that real interest rates in Canada cannot vary very much from those in the United States. Even in the presence of perfect capital substitutability, fiscal policy can play a useful role in stabilizing economic activity. Models that deny this short-run role for fiscal policy make extreme assumptions about the way expectations are formed and about wage and price flexibility (e.g., Mundell, 1963).

For real capital assets (the stock of business fixed assets as opposed to financial assets) there was no strong evidence in favour of or against the perfect capital mobility hypothesis. The evidence was consistent with very low mobility in the short run and quite high, if not perfect, mobility in the long run. With less than perfect mobility, government budget deficits would cause some crowding out of domestic investment as well as some reduction in the balance on current account.

Purpose and Scope

Our opening statement has spelled out the twofold purpose of the research summarized in this report. At the outset it should also be noted that in many cases policy prescriptions will depend less on the degree of asset substitutability than on other assumptions made about the economy, such as the formation of expectations, the degree of wage and price stickiness, and the degree of uncertainty about the economic structure.

Methodology

For our report we considered the implications of foreign exchange market intervention, monetary policy, and fiscal policy for output and prices. With respect to foreign exchange market intervention, the main question was whether asset substitutability was so high as to negate the use of a set intervention as an independent policy instrument. We then examined the question of the degree of asset substitutability and the effectiveness of monetary policy in two parts. For the first, we were concerned with the effects through the channels of real exchange rates and short-term real

interest rates. For the second part we were concerned with the long-term real interest rate. Next, in the context of high asset substitutability, we asked whether fiscal policy can affect domestic output in the short-to-medium run. An important question here was the degree to which changes in fiscal policy have crowding out effects on private fixed investment as opposed to effects on the balance of payments.

Our examination of the literature was not restricted (as we have said) to one theoretical model. The empirical evidence surveyed (supplemented at times with our own estimates) was taken from estimates of various models, not all of which were consistent with one another. The most general model would allow for imperfect substitutability across countries, currencies, and classes of assets. Our study proceeded under the assumption that there may be some degree of imperfect substitutability in Canada among five asset classes: currency, short-term money-market instruments, long-term bonds, equity capital, and real capital. The degree of substitutability for each class of asset was considered separately.¹ Since financial linkages with the United States are tighter than with other foreign countries, most of the empirical work we examined dealt with the substitutability between claims on Canadians and on Americans and/or with the substitutability between Canadian-dollar-denominated assets and U.S.-dollar-denominated assets.

Perfect asset substitutability for one class of financial asset will dominate demands for other classes in the determination of exchange rates. Therefore, because short-term assets are likely to have the highest degree of substitutability, we began with this category.² Our examination of exchange market intervention focussed on results for short-term assets, supplemented at times with results for all maturities of bonds. The same evidence was used in our examination of monetary policy and short-run fiscal policy. Evidence on the international substitutability of long-term bonds was introduced to examine whether monetary policy can work through its effects on long-term bond rates.

We concluded our research with a consideration of the mobility of real capital assets, and the long-run elasticity of the overall flow of real savings (which is equal to the balance of payments on current account). The evidence was used to make some inferences about the longer-run allocative effects of fiscal policy.

Summary of Findings and Conclusions

The available empirical evidence suggested that perfect capital *mobility* is a good approximation to the Canadian case, as covered interest differentials on short-term assets denominated in Canadian and U.S. dollars are very small. Therefore, emphasis was placed on models that can be used to answer questions about the degree of asset *substitutability* — models of the portfolio-balance type.

Short-term Assets and Official Exchange Market Intervention

In most of the empirical work reported or surveyed, perfect substitutability of short-term assets cannot be rejected, except in the short run. The work surveyed fell into four categories: rational expectations models where all investors have the same portfolio preferences, irrespective of country of residence (as in Frankel, 1979a; Rogoff, 1984) and rational expectations models where investors have a preference for local currency bonds (Frankel, 1979b, 1982); general two-country, portfolio-balance models³; models with short-run imperfect substitutability but long-run perfect substitutability; (e.g., the Bank of Canada's RDXF model) and the theoretically eclectic equations found in Canadian macroeconomic models.⁴

RATIONAL EXPECTATIONS MODELS

Rational expectations models generally did not provide statistically significant evidence that differences in expected rates of return on Canadian and U.S. dollar short-term instruments are dependent on stocks of Canadian or U.S. government bonds, as they would if such assets were imperfect substitutes. This implies that there is no evidence of a variable risk premium depending on asset stocks. Since recent empirical work has strongly rejected the joint hypothesis of rational expectations and a constant risk premium, our interpretation of the evidence is that there is likely a failure of the rational expectations hypothesis⁵; indeed, it seems that expectations can often be of an adaptive or extrapolative nature.

GENERAL TWO-COUNTRY, PORTFOLIO-BALANCE MODELS

The general two-country, portfolio-balance models found in the literature can be divided into four types:

1. those in which the exchange rate is the dependent variable and the stock of net foreign assets is an independent variable (e.g., Haas and Alexander, 1979; Freedman, 1979; Hooper et al., 1982; Helliwell and Boothe, 1982; RDXF);
2. those in which the stock of net foreign assets is the dependent variable and the exchange rate is an independent variable (e.g., the MACE model of Helliwell et al., 1982);
3. those in which the exchange rate is the dependent variable and the existing stocks of domestic money, foreign money, domestic currency bonds and foreign currency bonds are important explanatory

variables (e.g., Backus, 1982; Martin and Masson, 1979; Frankel, 1982); and

4. those in which the stock of government bonds is the dependent variable and rates of return are the important explanatory variables (e.g. Danker et al., 1985).

In specifications of the first type that include relative price levels (to measure purchasing-power parity), the stock of net foreign assets was found to be an insignificant determinant of the exchange rate. Models of type 2, proved very sensitive to the time period of estimation. Models of types 3 and 4 were classed by their authors as generally unsatisfactory in their explanatory power. Overall, there was little support for a portfolio-balance specification from these four types of models.

MODELS WITH IMPERFECT SUBSTITUTABILITY IN THE SHORT RUN ONLY

There was an indication that foreign and Canadian short-term assets are not perfect substitutes in the short run, as the balance of payments variables were found to have a significant impact on the exchange rate (for example, in the RDXF model).

EVIDENCE FROM OTHER CANADIAN MACROECONOMIC MODELS

In common with RDXF, there were no portfolio-balance (stock) effects on the exchange rate in the CANDIDE 2.0 or FOCUS models of the Canadian economy. The DRI and MTFM models showed such stock effects but both excluded a relative price term which is found to be highly significant in models such as RDXF. However, the SAM and MACE annual models did have stock effects.

CONCLUSIONS ON SHORT-TERM ASSETS AND OFFICIAL INTERVENTION

Overall, perfect capital substitutability cannot be rejected, except in the short run, in most of the empirical work that we examined. In particular, changes in the stocks of Canadian or U.S. government bonds and shifts in financial wealth internationally did not appear to affect expected differences in rates of return on Canadian and U.S. dollar instruments. Empirically, the interest rate in Canada is approximately equal to the interest rate in the United States plus the expected rate of depreciation of the Canadian dollar.

With respect to policy, one implication of our finding of very high substitutability of short-term assets is that official intervention cannot

work through a portfolio-balance channel to affect the exchange rate except over a fairly brief period. However, intervention may play a signalling role, and the presence of short-run imperfect substitutability means that it can be used as a smoothing device for the exchange rate over the short run.

Monetary Policy and Short-run Fiscal Policy

MONETARY POLICY

The high degree of substitutability of short-term, interest-bearing assets also has important implications for monetary policy. (Currency substitutability, in contrast, was not found to be economically important in the empirical literature.) These implications depend importantly on the economic model used — that is, whether one believes that the economy can be represented by a Mundell-Fleming model (perhaps augmented by additional features), a classical model, or a new-classical rational expectations model.

As a rule, however, the more highly substitutable domestic and foreign assets are, the greater the short-run impact of changes in monetary policy on domestic output and prices and the more they work through the exchange rate than through interest rates. The amount by which the real interest rate (the nominal interest rate adjusted for expected domestic inflation) will decline because of an expansionary monetary policy is determined not only by the degree of asset substitutability, but also by the degree of wage and price rigidity in the economy and by the way expectations of future exchange rate movements are formed. The available empirical evidence suggested that, in the short run, real interest rates can differ internationally and can be influenced by changes in domestic monetary policy. Moreover, such changes in interest rates are likely to be associated with changes in the real exchange rate.

Long-run monetary policy was not considered in any detail because in the long run, money can be assumed to be approximately neutral: a higher rate of money growth leads to an equally higher rate of inflation, with only second-order effects on real variables. This quantity theory result is independent of the degree of capital substitutability.

SHORT-RUN FISCAL POLICY

A change in fiscal policy will have a smaller short-run effect on output the higher the degree of asset substitutability. However, with sticky wages and prices and non-static exchange rate expectations, even with perfect substitutability there is room for some short-run output effect.

International Substitutability of Long-term Bonds and Monetary Policy

The degree of substitutability between U.S. and Canadian long-term bonds influences the independence of Canadian long-term interest rates. The comparison of expected domestic and foreign bond yields requires some assumptions concerning expectations about future changes in the exchange rate. In addition, the relationship between short- and long-term bonds depends on expectations about future short-term bond yields. In order to understand the formation of expectations in these two markets, evidence regarding the joint hypothesis of rational expectations and a constant risk premium was examined. For the bond market, the evidence surveyed showed that expected holding-period yields for Canadian short- and long-term bonds showed systematic differences, thus rejecting the joint hypothesis for the term structure. For the foreign exchange market, we found new evidence confirming previous work rejecting the joint hypothesis. The implication of this finding is that it may not be appropriate to confine tests of asset substitutability to models that impose rational expectations and assume that all information is costless.

Bond rate equations from Canadian macroeconomic models showed little evidence of the significant stock variables necessary for imperfect substitutability in a portfolio model framework. These equations were consistent with the hypothesis that the only significant variables determining Canadian bond rates are U.S. long- and short-term rates, and Canadian short-term rates. Updated estimates, using yields on hypothetical constant maturity bonds, strongly confirmed these findings. All this points to perfect substitutability as a useful working hypothesis.

Capital flow equations in Canadian macroeconomic models, however, often had significant interest rate differential variables. This means that at least some agents do not regard Canadian and foreign bonds as perfect substitutes. In these equations, the aggregation over a broad range of assets as well as agents with dissimilar (non-homogeneous) preferences and expectations made it difficult to interpret these results more confidently.

Political risk on long-term bonds was measured as the yield differential between bonds whose only difference lies in the citizenship of the issuer. Thus, political risk is best measured by comparing bonds of different governments issued in a common currency. Not much work on this question has been done, but one study indicated that a premium of about 0.6 percent is paid on Government of Canada U.S.-dollar-pay bonds over comparable U.S. government bonds (Lessard et al., 1983). This indicated an element of immobility for long-term capital that is not found for short-term capital.

Our estimated equations imply that even with perfect longer-term asset substitutability it is possible to affect domestic real long-term rates in the short run by changing short-term rates. There exists, therefore, a possible channel through which the authorities can affect the components of aggregate demand that are sensitive to long-term interest rates (e.g., housing, investment, consumer durables). With perfect substitutability, however, this influence will eventually disappear, since over the longer run, the expected change in the exchange rate will conform to the expected inflation differential between the two countries.

Capital Mobility and Long-run Fiscal Policy

The substitutability of real capital assets has implications for the longer-run allocative effects of fiscal policy. With respect to the balance of payments, there are two ways of examining the substitutability of real capital between Canada and abroad. The first is to study components of the capital account corresponding to capital ownership — i.e., direct and equity investment. The second is to study the behaviour over time of the net flow of real saving, which is by definition equal to the current account balance.

DIRECT AND EQUITY CAPITAL AND RATES OF RETURN

The evidence from direct and equity investment equations is mixed. Factors other than measured rates of return, such as changes in government policies, the industrial strategies of multinational firms, trade controls, and so on have exerted a preponderant influence on these flows. Tests are further hampered by the fact that strictly comparable rates of return across countries cannot be found. In any event, data on balance of payments flows as well as on current account/savings/investment behaviour across a number of industrial countries conveyed the impression of a world capital market that is quite segmented.

Just as for other assets, substitutability of real capital can also be assessed from the closeness of returns in Canada and abroad. Average measured rates of return on capital and equity in Canada and the United States diverged considerably during certain subperiods, but over the past two decades as a whole, there has been no significant difference. Given the problems of inter-country comparisons, not too much can be made of these findings, except that they are consistent with a low short-run substitutability and a high long-run substitutability. We might conclude that the supply of real capital from abroad to Canada is more elastic than to most other countries, but that it might be far from infinitely elastic. More research would be justified in this area: not many studies have been done, and it would seem important to explore this point further.

FISCAL POLICY IN THE LONG RUN: ALLOCATIVE IMPLICATIONS

With a vertical supply curve for real output, there can be no long-run effect of fiscal policy on the level of output, but the degree of substitutability of real capital has important allocative implications. If capital substitutability is perfect, then an increase in the government deficit can be financed by an inflow of capital from abroad with no significant increase in domestic interest rates. That is, the current account balance would be “crowded out” dollar for dollar with the increased deficit, with no crowding out of domestic investment. The consequences for gross national product (GNP), as opposed to gross domestic product (GDP) might, however, be just as severe because net foreign investment by residents decreases identically with the decline in the current account balance and thus net interest and dividend inflows would decrease over time.

In practice, substitutability is probably high enough that an increased government deficit can be expected, in the long run, to have a significant downward impact on the current account. The size of the current account impact would depend to some extent on the uses to which the deficit financing is put. An increase in government investment could be expected to attract a greater inflow of financing over time from abroad than an increase in government consumption since, in the long run, productive investment itself provides the means by which the financing may be serviced.⁶ An increase in government consumption would probably put greater upward pressure on domestic interest rates in the long run since, in the absence of an increased capital stock, a risk premium would likely be required to induce non-residents to hold increased national debt. Hence, increased government consumption spending would likely have a stronger crowding out effect on private investment than would increased government investment spending.

Notes

This study was completed in July 1984.

The views expressed in this study are those of the authors; no responsibility for them should be attributed to the Bank of Canada.

In January 1984, an earlier version of this study was discussed by the Research Advisory Group on Macroeconomics of the Royal Commission on the Economic Union and Development Prospects for Canada. We thank that group — in particular Pierre Fortin, David Laidler, John Sargent and Brian Scarfe — for their perceptive questions and suggestions. We also thank the two anonymous referees for their helpful comments and references.

Our colleagues at the Bank also made many suggestions that have been incorporated in this study. The research assistance of Doug Hostland is gratefully acknowledged.

The complete study from which this summary is excerpted was published by the Bank of Canada in February, 1985 under the title *International Asset Substitutability: Theory and Evidence for Canada*.

1. We did this in order to survey the existing empirical literature. The conditions under which portfolio allocation decisions for each class of asset would actually be undertaken separately would likely be rather stringent.
2. If all classes of assets are to some extent internationally substitutable, but less than perfectly so, then presumably these varying degrees of substitutability must be taken into account in determining policy implications in the three areas we consider. However, it is reasonable to assume, if there are differences in the degree of substitutability across classes of assets, that the ranking from the most substitutable to the least substitutable will be as follows: short-term financial instruments, long-term bonds, equity capital, and fixed investment. This ranking is based on the degree of comparability of assets across countries as well as the "term to maturity." (Currency substitution is left out of this ranking since the desire to hold domestic currency depends a great deal on the costs of transacting domestically in foreign currencies or other assets.)
3. The models that we looked at include Haas and Alexander (1979); Freedman (1979); Hooper et al. (1982); Helliwell and Boothe (1982); Helliwell et al. (1982); Backus (1982); Martin and Masson (1979); Frankel (1984); and Danker et al. (1985).
4. The models that we looked at include the Bank of Canada's RDXF and SAM models, the Economic Council's CANDIDE 2.0, the University of Toronto's FOCUS, the University of British Columbia's MACE, the Conference Board's MTFM, and the DRI model.
5. In these models the "rational" expectations hypothesis implicitly embodies the notion that information is costless.
6. This would imply that in cost-benefit analyses the social rate of discount should be calculated with a quite high weight on the foreign interest rate.

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Developments in Canadian Financial Markets: 1962–82

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Introduction

In any economy, it is the savings of the different sectors that provide the economic resources needed for that economy's investment. Within the framework of financial markets the savings undertaken by one set of households and firms in the economy is transformed by lending, borrowing and financial intermediaries into the investments made by a different set of households, firms and governments.

Financial markets in Canada have responded and adjusted to a wide range of external forces over the 1960s and 1970s. Among the most important of these forces are inflation, the age structure of the population, public policies with respect to taxation and financial institutions, and fluctuations in the level of economic activity. Moreover the effects of some of these factors are confounded by their interaction with others.

Inflation was essentially absent from the economy in the early 1960s but became a prominent feature by the late 1970s, averaging 9.3 percent from 1976 to 1981. Inflation affects financial markets most notably through its effect on the real value of financial claims that are denominated in terms of money. As inflation becomes expected, individuals and organizations rearrange their portfolios either to avoid the cost or to gain greater benefit from the influence of inflation and to react to the effects of past unexpected inflation. The influence of inflation is compounded by its interaction with the tax system, which in many ways is not designed to distinguish between real and inflation-induced changes.

The age structure of the population affects the behaviour of households in using and supplying funds. Current theories suggest that savings behaviour is quite specific to the age of a household. Younger house-

holds tend to save a smaller proportion of their income because income is low relative to levels expected later, whereas the saving of aged households is low or even negative as they run down assets accumulated previously to enable them to maintain their level of consumption throughout their lifetime. In contrast, the middle-aged save relatively more of their income in as much as they are in a period of high income relative to consumption needs. In any economy the amount of saving generated from income can be expected to depend on the distribution of the population across the different age groups.

Policy with respect to financial markets and financial institutions may alter the opportunities for all primary lenders and borrowers. For example, eligibility as investments for pension funds may limit the supply of funds for different uses. Over the period under review, the most important changes in the regulation of financial markets were the bank acts of 1967 and 1980. The former removed the restricting 6 percent ceiling on the interest rates charged by chartered banks; the latter formalized the status of foreign banks in Canada.

Finally, financial flows can be influenced by the swings in economic activity in the economy. Current theories suggest that savings from households increase in response to a rise in disposable income. Similarly, the funds generated within the business sector depend upon current profitability. On the other hand, the business sector's need for funds depends on the expectations of future business conditions, which may be shaped to a considerable degree by current conditions. As a point of reference for the following analysis, the timing of the peaks and troughs in business activity are presented in Table 7-1.

The purpose of this paper is to document the major changes that have occurred in Canadian financial markets from the early 1960s until the early 1980s. These changes are viewed from a variety of perspectives. Changing patterns in the sources and uses of funds will be examined according to the sector supplying or using the funds. Most flow data are presented on both an unadjusted and an inflation-adjusted basis to reflect the presence of inflation over much of the period and the need to take its effects in distorting the measurement of flows into account. In addition to flows, the stocks of financial assets held and financial liabilities issued are examined on a sector by sector basis. Finally, the role of the financial sector in indirect finance is isolated for special attention because of the importance of this approach.

The paper is divided into three sections. First, the sources and uses of funds are documented sector by sector over the period 1962–83. These data are presented as found in the flow of funds accounts and as adjusted for changing real values caused by inflation. Next the financial status of three sectors — households, corporate and international — is examined at three points in time: 1961, 1971 and 1982. The sectors are analyzed in terms of both the scale of financial assets and liabilities and their

TABLE 7-1 Peaks and Troughs in Economic Activity, 1962–83

Peak	Trough
March 1962	August 1963
February 1967	February 1968
December 1969	December 1970
March 1974	May 1975
October 1979	June 1980
June 1981	December 1982

Source: Maurice Lamontagne, *Business Cycles in Canada: The Post War Experience and Policy Directions* (Ottawa: Canadian Institute for Economic Policy, 1984); Statistics Canada, *Current Economic Analysis* (Ottawa, January 1984).

composition. Finally, the financial sector is examined in more detail with respect to the relative importance of different financial institutions and categories of financing.

Flows of Funds in the Canadian Economy

In this section of the paper we provide a framework for examining the sources and uses of funds in the Canadian economy during the last 20 years. The basic data for this purpose are figures compiled by Statistics Canada on the intersectoral flow of funds. The major concept we use is the idea of excess funding need (EFN). The EFN of a sector measures the amount by which its non-financial capital acquisition, or its accumulation of physical assets, exceeds the sum of its net savings and capital consumption allowance which together measure the funds it generates on its own for the acquisition of assets. A negative EFN for any sector indicates that the sector accumulated more funds than required to finance its acquisition of physical assets. In other words, it was a net lender and supplied funds to other sectors. Conversely, a positive EFN denotes a sector which was a net borrower and thus required funds from other sectors.

SECTORS OF THE ECONOMY

We divide the economy into five sectors: households, corporate, government, international, and financial institutions. The household sector includes both individuals and unincorporated businesses by necessity because these sectors are combined in the flow of funds statistics. In the absence of incorporation, there is little to distinguish the income of a business from that of its owner. The household sector so defined, corresponds to what Statistics Canada labels sectors I and II in the flow of funds accounts. The corporate sector includes non-financial private corporations and non-financial government enterprises, and corresponds to sectors III and IV in the flow of funds. Our third sector,

government, lumps federal, provincial and local governments together with monetary authorities and social security funds and includes sectors V, X, XI and XII in the flow of funds accounting framework. The fourth sector is the international, or the Rest of the World as sector XIII is termed in the flow of funds accounting.

The final sector, financial institutions, warrants somewhat greater discussion at this stage. It corresponds to sectors VI, VII, VIII, and IX in the flow of funds accounts and consists of chartered banks and near banks, insurance companies and pension funds, other private financial institutions, and public financial institutions. Generally, these financial institutions would not be expected to have a large EFN on their own, either negative or positive. Nevertheless, these financial institutions, or intermediaries, play an important role in the financial process by borrowing from economic units that have a negative EFN and lending to those that have a positive EFN. Thus they are substantial borrowers of funds at the same time as being substantial lenders, but their net position approximately equals zero.

MEANING OF FINANCIAL FLOWS

Flow of funds accounts are designed to measure only the net increase of an asset or liability account for any sector over some period of time. For example, the flow of funds might record that the household sector increased its supply of funds (a negative EFN) to other sectors in the economy by \$2 billion in a particular year. This \$2-billion supply of funds could be composed in a variety of ways. For example, the households might have acquired \$2 billion additional bond holdings from other sectors over the year. Alternatively, the households could have increased their holdings of bonds issued by other sectors to the extent of \$4 billion but at the same time decreased their holdings of short-term paper by \$2 billion. The total gross financing differs in these examples, but in each instance the households supplied \$2 billion to other sectors.

The flow of funds accounts as measured by Statistics Canada fail in one other respect to take account of all the gross funding that occurs in the economy in a given year. In the second example given above, the \$4 billion increase in net holdings of bonds is consistent with various patterns of gross finance. The net figure is composed of the difference between the total bonds acquired from other sectors and the repayment or repurchase of retired bonds over the period. Thus the \$4 billion figure is consistent with households acquiring \$8 billion bonds from other sectors at the same time as having \$4 billion of previously outstanding bonds repaid, as well as many other patterns.

INFLATION AND THE FLOW OF FUNDS

The flow of funds accounts have been designed, then, to measure the scale of the net financial flows among sectors. Assuming accurate rec-

ording of transactions, the existing framework accurately captures net flows of investible resources among sectors only during periods of price stability. The period under review in this study, however, includes the years of up-to-double-digit inflation in the 1970s in addition to years of virtual price stability. It is useful to examine how inflation affects the measurement of financial flows.

As is well-known, inflation erodes the real value of any claims denominated in money terms. Figuratively, inflation causes outstanding money debt to be “repaid” in the sense that the real value of both the creditor’s assets and the debtor’s liabilities are reduced by the higher price level. The repayment does not reflect any transfer of funds from lenders to borrowers but rather a changed real valuation of existing money claims. This revaluation means that both the supply of funds by net monetary lenders and the inflow of funds to net monetary debtors must be reinterpreted. Part of the funds supplied currently by lenders just offsets the reduction in the money value of their claims which result from inflation and does not augment the accumulated real value of their claims on borrowers.

The Statistics Canada Inflation Model for the Canadian System of National Accounts provides the source of the inflation adjustments used in this study.¹ Two types of adjustments are made in this model to correct for the distortion to the measurement of financial flows caused by inflation. First, the model adjusts capital cost allowances to reflect the fact that they are derived on the basis of historic cost rather than current replacement cost. Second, and more importantly, the model corrects the financial flows for the change in the real value of monetary debt as caused by inflation. Each of these adjustments is elaborated below.

The capital cost allowances as presented in the financial flow accounts are based on the actual cost of acquisition. During periods of inflation, however, if the price level is above that prevailing at the time of acquisition, the current allowances for capital consumption understate the cost of replacing that part of the asset’s use attributed to current production.

The consequences of this distortion in capital cost allowances for the present analysis are several. Current net income from production is overstated because of the understated measurement of capital consumption allowances. Since savings are measured as net income less consumption expenditures and taxes, savings will similarly be overstated. For this study the key variable is the excess funding, which is the difference between sectoral non-financial capital acquisition and the sum of net savings and capital consumption allowances. Each of the latter elements — net savings and capital consumption allowances — are affected in opposite and offsetting ways. The Statistics Canada model adjustment adds to the capital consumption allowances exactly the amount deducted from the net income and hence net savings. Thus, the adjustment to capital consumption allowances necessitated by the effects of inflation does not alter the total of excess funding needs of any

sector but does change their division between net savings and capital consumption allowances.

The type of second adjustment for the effects of inflation on nominal assets is similar in spirit to the netting of gross lending and repayment for any sector in the flow of funds under price stability.² The key concept in the second adjustment is inflation-adjusted savings. This concept must be explained carefully to make its meaning clear and to distinguish it from both real savings and nominal savings as reported in the flow of funds.

As a first step, real savings of any sector can be expressed as the change in the real value of assets held by that sector:

$$RS_t = \frac{A_t}{P_t} - \frac{A_{t-1}}{P_{t-1}} \quad (1)$$

where RS is real saving; A_t , total net assets valued at the prices of period t ; and P_t , the price level in period t . Total net assets consist of both real net assets and nominal (or money-denominated) net assets:

$$A_t = N_t + P_t r_t \quad (2)$$

where N represents the nominal value of money-denominated assets and r , the real value of real assets, and thus Pr represents the nominal value of real assets. Equation 1 can be expressed as

$$RS_t = \frac{N_t}{P_t} + r_t - \frac{N_{t-1}}{P_{t-1}} - r_{t-1} \quad (3)$$

Rearrangement of equation 3 together with the addition and subtraction of $\frac{N_{t-1}}{P_t}$ gives:

$$RS = \frac{N_t}{P_t} - \frac{N_{t-1}}{P_t} + r_t - r_{t-1} - \left(\frac{N_{t-1}}{P_{t-1}} - \frac{N_{t-1}}{P_t} \right) \quad (4)$$

$$= \frac{N_t}{P_t} - \frac{N_{t-1}}{P_t} + r_t - r_{t-1} - N_{t-1} \left(\frac{1}{P_{t-1}} - \frac{1}{P_t} \right) \quad (5)$$

$$= \frac{N_t}{P_t} - \frac{N_{t-1}}{P_t} + r_t - r_{t-1} - \frac{N_{t-1}}{P_t} \left(\frac{P_t}{P_{t-1}} - 1 \right) \quad (6)$$

$$= \frac{N_t - N_{t-1}}{P_t} + r_t - r_{t-1} - \frac{N_{t-1}}{P_t} \left(\frac{P_t - P_{t-1}}{P_{t-1}} \right) \quad (7)$$

Equation 7 identifies three components of real savings. The numer-

ator of the first term indicates the change in nominal valued assets over the period; the next term indicates the change in the real value of real assets; and the final term measures an inflation adjustment to reflect the effects of a changed price level on the real value of nominal assets.

The concepts used in this study embody inflation-adjusted nominal savings which are derived by multiplying real savings by the price level from equation 7 to give a nominal measure:

$$IAS_t = (N_t - N_{t-1}) + P_t(r_t - r_{t-1}) - N_{t-1} \left(\frac{P_t - P_{t-1}}{P_{t-1}} \right) \quad (8)$$

Again each of the three elements can be interpreted. The first element is the change in nominal assets over the period, and the second element is the change in real assets valued in terms of prices at the end of period. These two elements represent nominal savings as conventionally measured in the flow of funds accounts. The final element represents an adjustment to the nominal assets at the start of the period to reflect the decrease in their real value resulting from inflation.

One final complication for the inflation adjustment that should be mentioned arises because of the presence of claims denominated in foreign currencies. The value of these claims changes in response to changes in exchange rates as well as to inflation. The Statistics Canada procedure, in effect, revalues these claims in terms of Canadian dollars to take into account any adjustment of exchange rates. The Canadian-dollar equivalent value is in turn adjusted by the rate of inflation. As in the case of the simple inflation adjustment, the supply of funds by net monetary creditors and the demand for funds by net monetary debtors are both reduced by the inflation-induced change in the real value of monetary claims.

Although the concept of inflation-adjusted savings has been discussed so far in terms of net money creditors, it holds equally well for sectors that consist of net monetary debtors. For net monetary creditors, this imputation represents the reduced real value of their claims on others and must be deducted from their supply of funds or added to their demand for funds. In contrast, for net monetary debtors, the imputation represents a reduced real value of their claims to others and must be deducted from their demand for funds or added to their supply of funds.

The exact meaning of the resulting adjusted data must be understood clearly. The adjustment is not intended to express the real value of funding among sectors in terms of the price level of any base year. Rather the adjustment is directed toward separating the financial flows among sectors into two components: (1) the flow required to offset the changed real value on outstanding claims resulting from inflation, and (2) the flow of new finance. Both these measures are expressed in terms of current money values.

In an economy in which inflation was fully and accurately expected, in which all economic units were able to act upon their expectations, and in which taxes and other institutional arrangements were neutral in real terms with respect to inflation, lenders would require higher rates of interest to compensate for the eroded real value of their monetary assets, but borrowers would be prepared to pay these higher rates for they would share the lender's expectations. The measured financial flows in such an economy would encompass both the interest flows between lenders and borrowers that would have occurred in absence of inflation and also the reinvestment by lenders of the higher interest flows that compensate for inflation. The inflation-adjusted measures of financial flows would correct for the effect of inflation and would thus correspond to the pattern that would have occurred in the absence of inflation.

Any actual economy falls short of this ideal in many respects. In particular, inaccurate expectations of inflation cause redistributions between monetary creditors and monetary debtors. If actual inflation exceeds the expected, the level of interest rates would not have adjusted sufficiently to offset the erosion in the real value of the creditor's monetary wealth, and a net redistribution of wealth would take place from creditors to debtors. Similarly, though less well recognized, when expected inflation in fact exceeds the subsequent actual rate, wealth is redistributed from monetary debtors to monetary creditors. The fact that inflation is not easily anticipated and that, as a consequence, redistribution occurs between lenders and borrowers, does alter the meaning of the inflation-adjusted financial flows. They are measures of the transfer of actual resources from lenders to borrowers and must include, in addition to the funds transferred through financial markets, the offsetting transfers caused by inflation.

The institutional structure of the economy may influence the ability of various lenders and borrowers to offset any effects of inflation on their portfolios to different degrees. Expected inflation increases the interest to be paid on any nominal claim but at the same time erodes the real value of the debt. In effect, the payment schedule is tilted in a way that requires higher real payments initially but lower real payments in the future. Many large borrowers, such as businesses and major corporations, which are continually borrowing through financial markets, can undo the tilting effect by new borrowings to offset the high initial interest payment. In effect, they can maintain the real value of their debt at the planned level by new borrowings. Still, to the extent that lenders use rules of thumb such as interest coverage to earnings, the fact that some apparent interest expense compensates for the erosion of the lender's claim may affect the credit rating of the borrower. At the other extreme, for the small borrower, such as the household or small business, the tilting problem may be more severe because they borrow infrequently and hence their ability to rearrange outstanding claims to offset the effects of inflation is limited.

The experience of other countries which have suffered higher rates of inflation does suggest that the form and structure of the institutional framework may respond to prolonged or rapid inflation in such a way to alleviate its costs (Howitt, 1984). Many of these responses incorporate some form of indexing or a close substitute. To some extent, such innovations did arise in Canada as a response to the inflationary experience of the 1970s. For example, many more mortgage options were available to home-owners at the end of the decade. Some even incorporated features that permitted home-owners to alleviate directly the effects of tilting.

The effects of inflation on the flows of financial markets will be many and varied, depending on the expectations, the existing institutional framework, and the ability of this framework to respond. The adjusted financial flows presented in this study cannot show what these flows would have been in the absence of inflation. Nevertheless, what they do measure is clear. They measure the inflation-adjusted value of the resources transferred among the different sectors through the lending and borrowing in financial markets.

Measures of Financial Flows

In the analysis that follows, the flow of funds accounts are presented in a form adjusted for the effects of inflation and also in the unadjusted form. In light of the preceding discussion, it may be questioned whether the unadjusted accounts should be presented at all when the adjusted flows of funds capture the net sources and uses of funds in the economy. The unadjusted flows, however, do measure one important dimension of financial markets: the actual volume of financial transactions among sectors in the economy.

THE HOUSEHOLD SECTOR

The household sector supplies financial markets with the most persistently important source of funds — negative excess funding needs in our terminology. Table 7-2 displays the EFN of the household sector from 1962 divided into five-year intervals plus 1982 and 1983. In the table we have included the constituent parts of EFN: non-financial capital acquisition (which includes gross fixed capital formation, value of physical change in inventories, and net purchase of existing and intangible assets), net savings, and the capital consumption allowance. Not surprisingly, in light of the inflation of the past decade, the nominal supply of funds has increased substantially. But what is striking about the table is the rapid growth of net savings relative to non-financial capital acquisition and the capital consumption allowance. By the 1977–81 period, net savings had increased tenfold relative to the 1962–66 average, while non-financial acquisition and the capital consumption allowance had

TABLE 7-2 Excess Funding Needs of the Household Sector: Unadjusted

Year	I	II	III	IV
	Non-financial capital acquisition	Net saving	Capital consumption allowance (CCA)	Excess funding needs (I – II – III)
		(\$ millions)		
1962	2,562	1,651	1,660	– 749
1963	2,715	1,826	1,770	– 881
1964	2,643	1,499	1,960	– 816
1965	2,976	1,961	2,126	– 1,111
1966	3,340	2,818	2,346	– 1,824
1967	3,167	2,641	2,474	– 1,948
1968	3,537	2,379	2,631	– 1,473
1969	3,290	2,741	2,794	– 2,245
1970	2,766	2,964	2,891	– 3,089
1971	3,948	3,574	3,086	– 2,712
1972	4,446	4,966	3,402	– 3,922
1973	6,104	7,243	4,013	– 5,152
1974	6,786	9,906	4,716	– 7,836
1975	8,192	12,025	5,386	– 9,219
1976	9,505	11,621	6,789	– 9,877
1977	11,264	12,579	7,568	– 9,875
1978	11,143	17,108	8,342	– 13,265
1979	13,699	20,249	9,450	– 14,212
1980	12,537	25,203	10,592	– 20,651
1981	14,253	32,844	11,911	– 25,384
1982	10,415	39,313	12,553	– 36,228
1983	14,803	36,384	12,928	– 33,019
Five-year averages				
1962–66	2,847.2	1,951.0	1,972.4	– 1,076.2
1967–71	3,341.6	2,859.8	2,775.2	– 2,293.4
1972–76	7,006.6	9,152.2	4,861.2	– 7,201.2
1977–81	12,579.2	21,596.6	9,572.6	– 16,677.4

Source: Statistics Canada, *Financial Flows Accounts*.

increased 4.4 and 4.9 times. Thus, from this perspective, the large increase in funds available from households is due largely to the change in net savings.

The source of the 15-fold increase in (negative) excess funding needs can be explored more deeply if we consider the ratio of net personal savings to personal disposable income. Over the past years, savings have increased dramatically relative to income. The figures on an unadjusted basis are presented in Table 7-3. From 4 to 7 percent of income was saved in the 1960s; a much higher proportion was being saved later — on average more than 11 percent from 1976 to 1981. In addition, the proportion of that saving that is available to supply funds to other

TABLE 7-3 Personal Disposable Income and Savings

Year	Personal disposable income	Net personal savings	Net personal savings rate	Adjusted net personal savings rate
	(\$ millions)			(percent)
1962	29,340	1,647	5.6	4.1
1963	31,168	1,691	5.4	4.3
1964	33,049	1,383	4.2	2.8
1965	36,263	2,001	5.5	3.6
1966	39,901	2,662	6.7	3.8
1967	43,123	2,736	6.3	3.4
1968	46,820	2,639	5.6	2.1
1969	50,911	2,730	5.4	2.1
1970	54,009	2,872	5.3	3.4
1971	59,943	3,509	5.9	3.6
1972	68,100	5,015	7.4	4.2
1973	79,719	7,230	9.1	2.9
1974	94,545	9,406	9.9	1.1
1975	110,996	12,139	10.9	5.5
1976	123,309	11,588	9.2	5.1
1977	138,307	12,545	9.1	3.9
1978	156,070	16,888	10.8	6.5
1979	175,956	19,957	11.3	5.7
1980	199,740	24,507	12.3	5.0
1981	233,357	33,214	14.2	7.3
1982	255,954	39,006	15.2	8.0
1983	270,056	35,995	13.3	10.0
Five-year averages				
1962-66			5.5	3.8
1967-71			5.7	2.9
1972-76			9.3	3.8
1977-81			11.5	5.7

Source: Statistics Canada, *Financial Flows Accounts*; Department of Finance, *Economic Review*, April 1985 (Ottawa: Minister of Supply and Services Canada, 1985).

sectors has also increased, although more sporadically. The ratio of excess funding needs to net savings indicates a gradual increase as proportionally more funds become available from the savings base. This slower growth of non-financial capital acquisition relative to net savings has been the main contributor to this change. Thus, viewed in unadjusted terms, the increase in funds available to the rest of the economy arises both because there is a change in the ratio of income to net savings and because the ratio of excess funds to savings has increased. As we shall see later, this helps to explain why the household sector has

TABLE 7-4 Excess Funding Needs of the Household Sector: Adjusted

Year	I Net savings	II Inflation adjustment (assets)	III Inflation adjustment (CCA)	IV Adjusted net savings (I-II-III)	V Adjusted CCA ^a	VI Excess funding needs ^b
				(\$ millions)		
1962	1,651	458	567	626	2,227	-291
1963	1,826	613	603	610	2,373	-268
1964	1,499	850	691	-42	2,651	34
1965	1,961	1,232	754	-25	2,880	121
1966	2,818	1,476	790	552	3,136	-348
1967	2,641	1,370	790	481	3,264	-578
1968	2,379	1,379	853	147	3,484	-94
1969	2,741	2,110	894	-263	3,688	-135
1970	2,964	1,983	821	160	3,712	-1,106
1971	3,574	2,084	814	676	3,900	-628
1972	4,966	3,258	919	789	4,321	-664
1973	7,243	7,157	1,080	-904	5,093	2,005
1974	9,906	8,970	1,138	-202	5,854	1,134
1975	12,025	7,421	1,250	3,354	6,636	-1,798
1976	11,621	6,880	1,403	3,338	8,192	-2,997
1977	12,579	5,568	1,506	5,505	9,074	-4,307
1978	17,108	6,899	1,553	8,656	9,895	-6,366
1979	20,249	14,643	1,687	3,919	11,581	-13
1980	25,203	15,827	1,793	7,583	12,385	-4,824
1981	32,844	19,413	1,757	11,674	13,668	-5,971

1982	39,313	17,680	1,958	19,675	14,511	-18,628
1983	36,384	8,125	2,076	26,183	15,008	-24,898
Five-year averages						
1962-66	1,951.0	925.8	681.0	344.2	2,653.4	-150.4
1967-71	2,859.8	1,785.2	834.4	240.2	3,609.6	-508.2
1972-76	9,152.2	6,737.2	1,158.0	1,257.0	6,020.2	-464.0
1977-81	21,596.6	12,470.0	1,659.2	7,467.4	11,320.6	-4,296.2

Source: Statistics Canada, *Financial Flows Accounts*; Statistics Canada, National Accounts Development Division, *Inflation Adjusted Cross and Net Sector and Sub-Sector Savings* (Ottawa, February 1985).

- Capital consumption allowance from Table 7-2 plus column III.
- Non-financial capital acquisition from Table 7-2 less (IV + V).

become the dominant supplier of funds to the rest of the economy as sources of funds in the past — the government sector in particular — have become net demander of funds, and the role of the international sector has also diminished.

When the statistics of the funds supplied by households are adjusted for inflation, a different picture emerges. Households overall have large holdings of net monetary assets, which suffer erosion in real value in times of inflation, offsetting the supply of funds flowing from the households to other sectors. As can be seen from Table 7-4, the adjustment for inflation to assets grew steadily through the period, increasing 13 times from 1962–66 to 1977–81. The household sector's supply of funds to other sectors is substantially smaller when adjusted. However, the adjustment does not reduce the anomaly, noted previously, of changing proportions of different sources of funds from households. When net saving is adjusted for inflation, it grows 16 times between the first and final periods compared to the fourfold increase in the capital consumption allowances.

The ratio of adjusted net personal savings to adjusted disposable income is presented in the final column of Table 7-3. As can be seen, the adjustment for inflation reduces substantially the ratio of household savings to disposable income over the entire period but most especially in the latter two subperiods. Moreover, this adjustment also eliminates much of the trend in the ratio of personal savings to disposable income over the period.

To what extent can the patterns of excess funding needs of households be explained by the economic forces discussed earlier? Perhaps the most striking feature of household savings are the negative figures recorded for adjusted net savings in the periods, 1964–65, 1969, 1973–74, together with the sharp decrease in this variable in 1979. Each of these episodes of negative household saving, except for 1969, coincided with a net demand for funds by households as measured by a positive adjusted EFN.

As discussed earlier, one possible source of fluctuations in the savings rate arises from fluctuations in economic activity. Modern theories of savings emphasize the efforts of households to stabilize their consumption relative to fluctuations of current income. Thus, according to this interpretation, savings fall disproportionately to income when income falls, or tend to be relatively low when income is below its trend. Comparisons of personal savings with the cyclical fluctuations presented in Table 7-1, however, do not suggest any close relationship. All the periods of depressed savings, with the exception of the 1974 portion of 1973–74, corresponded to periods of expansion.

Another possible influence on the level of saving is the rate of inflation. It has been argued that, if inflation is fully expected, it should have little effect on inflation-adjusted household behaviour. On the other hand, households are unlikely to anticipate inflation fully and accurately. To

TABLE 7-5 Real Rates of Return, 1964–80

	91-day Treasury Bills	Long-term Canada Bonds	Inflation (CPI)
1964	1.79	4.48	1.93
1965	1.05	–1.87	2.90
1966	1.39	–1.92	3.55
1967	.04	–5.99	4.14
1968	2.09	–4.37	4.09
1969	2.50	–6.47	4.58
1970	4.46	19.67	1.46
1971	–1.41	5.98	5.14
1972	–1.46	–3.76	5.09
1973	–3.34	–6.78	9.12
1974	–4.13	–12.48	12.46
1975	–1.91	–6.09	9.48
1976	2.88	11.99	5.82
1977	–1.98	–3.32	9.50
1978	.23	–6.56	8.43
1979	1.76	–11.14	9.76
1980	1.42	–8.22	11.21

Source: J. Pesando, *The Use of "Excess" Pension Fund Earnings to Provide Inflation Protection for Private Pensions* (Toronto: Ontario Economic Council, 1983), 10.

the extent that households have failed to anticipate inflation, they would also fail to react to the larger-than-expected reduction in the real value of their money-denominated assets. As a result, current savings, adjusted for the eroded value of these assets, would be below the levels planned at current levels of income.

Some correspondence can be found between the periods of low savings and unexpected inflation. In particular, in the years 1973–74, the inflation rate, which averaged 10.5 percent, exceeded the rate of the two previous years. Similarly 1969 and 1979 levels were above those of previous years. Another indication of this effect can be found by examining the "real" rate of interest over these periods. Unexpected inflation would not be reflected in market interest rates and thus correction of market rates for the effects of inflation would be expected to lead to a lower-than-normal real rate. Pesando's (1983) data on real rates over the period are presented in Table 7-5. As can be seen, 1969, 1973–74 and 1979 all correspond to large negative values for the real rate on government bonds. These years account for four of the seven instances when the real rate fell below -6 percent. The relationship is less clear for the treasury bill rate. Still, the real return on treasury bills was at its lowest level in 1973–74, the years of the lowest rates of savings.

The trend in the personal net savings rate appears to be less amenable to interpretation than the year-to-year fluctuations in that rate. As seen from comparison of the adjusted and unadjusted savings rate in

Table 7-3, much though not all of the apparent trend is eliminated by the adjustments made to reflect the effects of inflation. Although some modifications to the tax system, such as RRSP and RHOSP provisions, were made during the period under review, Jump and Wilson (1985) argue that it is unlikely that the introduction of the RRSP contributed much upward pressure on personal savings.

THE CORPORATE SECTOR

The excess funding needs of the corporate sector are shown on an unadjusted basis in Table 7-6 and on an adjusted basis in Table 7-7. Inflation has reduced substantially the real value of outstanding debt over the past 20 years. The required adjustment to net monetary assets grew from an average level of \$820 million over the period 1962–66 to a level of \$12,746 million for the period 1977–81. Offsetting this first adjustment was the further adjustment for inflation to the capital cost allowance, which expanded from an average level of \$316 million in 1962–66 to \$14,378 million in 1977–81.

The adjustment to monetary assets to reflect inflation increases net savings for the corporate sector because it is a net creditor, whereas the adjustment to capital cost allowances reduces net savings because of the understatement of these allowances caused by the difference between the current price level and prices at the time the new capital was acquired. Examination of Table 7-7 shows that the net effect of the two adjustments changed over the period. In the years prior to 1976, the inflation adjustment to capital consumption allowances exceeded that to monetary assets only in 1971. In contrast, from 1976 to 1983 the adjustment to capital consumption allowances exceeded the adjustment to monetary assets in six of the eight years.³ As a result, adjusted net savings were larger than unadjusted net savings for most of the early part of the period but were generally less during the last part.

The data on unadjusted excess funding needs in Table 7-6 show the corporate sector to be a net user of funds throughout the period under review. Although the average excess funding needs grew over eightfold between the first and final periods, the growth was not steady. The financial needs of the corporate sector contracted in 1967–68, 1975–76, and again in 1982–83. The first instance reflected a decline in capital acquisition and corresponded with the recession that followed the February 1967 peak in economic activity. Similarly, the 1982 situation also reflected a substantial decline in investment corresponding to the decline in economic activity. The remaining episode, 1975–76, appears more complex. Capital acquisition remained steady for the first year but was more than offset by an increase of capital consumption allowances. In 1976, capital acquisition actually increased strongly but excess fund-

TABLE 7-6 Excess Funding Needs of the Corporate Sector: Unadjusted

Year	I	II	III	IV
	Non-financial Capital Acquisition	Net Savings	Capital Consumption Allowance (CCA)	Excess Funding Needs (I – II – III)
			(\$ millions)	
1962	4,992	1,314	2,960	718
1963	5,457	1,556	3,157	744
1964	7,055	2,189	3,421	1,445
1965	8,848	2,430	3,710	2,708
1966	10,150	2,447	4,053	3,650
1967	9,323	2,389	4,322	2,612
1968	9,385	2,632	4,614	2,139
1969	11,120	2,137	4,932	4,051
1970	11,503	2,795	5,598	3,110
1971	12,594	3,410	5,983	3,201
1972	14,352	3,162	6,481	4,709
1973	18,246	3,823	7,518	6,905
1974	24,002	3,668	9,045	11,289
1975	23,180	3,978	10,222	8,980
1976	28,306	6,106	11,693	10,507
1977	29,802	5,398	13,094	11,310
1978	32,885	5,882	14,690	12,313
1979	42,075	9,337	17,135	15,603
1980	46,292	11,712	20,258	14,295
1981	57,782	4,778	23,291	29,713
1982	45,212	–2,272	25,740	21,744
1983	46,337	9,696	27,394	9,247
Five-year averages				
1962–66	7,300.4	1,987.2	3,460.2	1,853.0
1967–71	10,785.0	2,672.6	5,089.8	3,022.8
1972–76	21,617.2	4,147.4	8,991.8	8,478.0
1977–81	41,767.2	7,421.4	17,693.6	16,646.8

Source: Statistics Canada, *Financial Flows Accounts*.

ing needs declined because of growth in capital consumption allowances and, unlike the previous year, strong growth in savings.

A somewhat different pattern emerges from the adjusted data on excess funding needs presented in Table 7-7. As before, the need for funds declines during 1967–68 and 1982. The adjustment makes the corporate sector a net supplier of funds in 1973 and 1980. In addition, a decline in the corporate sector's need for funds becomes apparent in 1970–71, 1975 and 1979. Part of the explanation for this pattern can be attributed to a factor discussed in the personal sector, the effect of

TABLE 7-7 Excess Funding Needs of the Corporate Sector: Adjusted

Year	I Net savings	II Inflation adjustment (assets)	III Inflation adjustment (CCA)	IV Adjusted net savings (I - II - III)	V Adjusted CCA ^a	VI Excess funding needs ^b
				(\$ millions)		
1962	1,314	-399	284	1,429	3,244	319
1963	1,556	-514	286	1,784	3,443	230
1964	2,189	-722	308	2,603	3,729	723
1965	2,430	-1,092	288	3,234	3,998	1,616
1966	2,447	-1,372	416	3,403	4,469	2,278
1967	2,389	-1,289	468	3,210	4,790	1,323
1968	2,632	-1,314	500	3,446	5,114	825
1969	2,137	-2,094	652	3,579	5,584	1,957
1970	2,785	-1,734	1,608	2,921	7,206	1,376
1971	3,410	-2,046	2,160	3,296	8,143	1,155
1972	3,162	-3,237	2,184	4,215	8,665	1,472
1973	3,823	-7,221	2,718	8,326	10,236	-316
1974	3,668	-9,262	4,362	8,568	13,407	2,027
1975	3,978	-8,056	6,330	5,708	16,552	920
1976	6,106	-7,561	7,572	6,095	19,265	2,946
1977	5,398	-5,211	9,698	911	22,795	6,096
1978	5,882	-6,339	11,558	663	25,621	6,601
1979	9,337	-15,780	13,446	11,671	29,077	1,327
1980	11,712	-15,061	16,204	10,569	35,792	-69
1981	4,778	-21,343	20,986	5,225	42,930	9,627

1982	-2,272	-16,704	20,542	-6,110	44,904	6,418
1983	9,696	-5,083	12,407	2,372	39,290	4,045
Five-year averages						
1962-66	1,987.2	-819.8	316.4	2,490.6	3,776.6	1,033.2
1967-71	2,672.6	-1,695.4	1,077.6	3,290.4	6,167.4	1,327.2
1972-76	4,147.4	-7,067.4	4,633.2	6,582.4	13,625.0	1,409.8
1977-81	7,421.4	-12,746.8	14,378.4	5,807.8	31,243.0	4,716.4

Sources: Statistics Canada, *Financial Flows Accounts*; Statistics Canada, National Accounts Development Division, *Inflation Adjusted Cross and Net Sector and Sub-Sector Savings* (Ottawa, February 1985).

a. Capital consumption allowance from Table 7-6 plus III.

b. Non-financial capital acquisition from Table 7-6 less (IV + V).

unexpected inflation. For the corporate sector, as a net debtor, unexpected inflation reduces the real value of corporate debt. If other elements of corporate funding do not respond to this effect, the adjusted funding needs of the business sector would fall. This effect would appear to be a major factor accounting for the negative funding needs of business in 1973 and 1980, years in which the real returns on long-term government bonds were strongly negative. Indeed these years accounted for two of the four lowest returns on government bonds.

THE GOVERNMENT SECTOR

The unadjusted financial flow data presented in Table 7-8 indicate that, over the past 20 years, government as an aggregate in Canada has gone from being a small net demander or supplier of funds to being a substantial net demander of funds. When the EFN of the government sector is adjusted to reflect the decreased real value of its debt, the pattern of government use of financial markets is changed considerably (Table 7-9). In the first period, the government changed from a net user of funds to a net supplier of funds, though in both cases the absolute amount is small. The government's supply of funds from 1967 to 1971 is accentuated, whereas its apparent use of funds is eliminated in 1972-76 and reduced by \$4,271 million in 1977-81.

As with the other sectors, the funding needs of the government sector are influenced by fluctuations in economic activity. The effects of these fluctuations can be determined by examining the difference between actual budget balances and cyclically adjusted balances which are presented in Table 7-10. The cyclically adjusted balance is constructed to show what the balance would have been had economic activity remained stable at a relatively high level.⁴ Since government revenues depend on the level of income, an excess of the actual over the adjusted surplus indicates that the level of activity exceeds the benchmark.

The patterns of economic activity presented in Table 7-1 are of only limited helpfulness in explaining the difference between actual and cyclically adjusted balances for government. The trough of 1970 corresponds with the first negative difference between the measures. Similarly the trough of June 1980 corresponds with a sharp increase in the negative difference. On the other hand, the difference remained at high levels from 1980 onward, despite the recovery to June 1981.

Unexpected and expected inflation would affect the government budget balance in different ways. If inflation were fully expected, the decreased real value of government debt would tend to be offset by the increased interest payments caused by higher nominal interest rates less the higher taxes on nominal interest payments. In effect, the government is unable to gain any advantage from the reduced real value of its debt.

**TABLE 7-8 Excess Funding Needs of the Government Sector:
Unadjusted**

Year	I Non-financial capital acquisition	II Net savings	III Capital consumption allowance	IV Excess funding needs (I – II – III)
			(\$ millions)	
1962	1,911	620	575	716
1963	1,988	720	630	638
1964	1,952	1,391	677	– 116
1965	2,434	1,869	769	– 204
1966	2,862	2,403	865	– 406
1967	3,155	2,208	923	24
1968	3,220	2,527	989	– 296
1969	3,236	3,863	1,114	– 1,741
1970	3,412	2,735	1,232	– 515
1971	4,048	2,510	1,335	203
1972	4,235	2,570	1,496	169
1973	4,301	3,832	1,711	– 1,274
1974	5,877	6,122	2,162	– 562
1975	7,207	– 220	2,526	4,578
1976	8,090	312	2,829	4,932
1977	6,829	– 1,329	3,161	5,412
1978	7,418	– 3,691	3,599	7,249
1979	7,034	– 1,234	4,066	4,613
1980	8,145	– 4,358	4,614	5,977
1981	9,308	– 1,456	5,373	4,034
1982	11,219	– 13,134	5,965	19,463
1983	10,797	– 20,103	6,780	22,563
Five-year averages				
1962–66	2,229.4	1,400.6	703.2	125.6
1967–71	3,414.2	2,768.6	1,118.6	– 46.5
1972–76	5,942.0	2,523.2	2,144.8	1,572.0
1977–81	7,746.8	– 2,413.6	4,162.6	5,457.0

Source: Statistics Canada, *Financial Flows Accounts*.

The government balance adjusted for inflation would reflect the underlying features of government revenues and expenditures other than the component of interest on the government debt which compensates for inflation. If inflation is unexpected, however, the reduced value of government debt is not offset by increased interest payments but serves as a form of revenue to help finance other expenditures. Thus this influence tends to make government more of a supplier (or less of a user) of funds during periods of unexpected inflation. A comparison of Table 7-5 with Table 7-9 gives some support to this conjecture. Large negative yields

1982	-13,134	-6,239	—	-6,895	5,965	13,225
1983	-20,103	-3,353	—	-16,750	6,780	19,204
Five-year averages						
1962-66	1,400.6	-491.6	—	1,892.2	703.2	-366.0
1967-71	2,768.6	-597.0	—	3,365.8	1,118.6	-1,061.2
1972-76	2,523.2	-1,748.8	—	4,727.0	2,144.8	-171.0
1977-81	-2,411.6	-4,271.2	—	1,859.6	4,162.6	1,187.6

Sources: Statistics Canada, *Financial Flows Accounts*; Statistics Canada, National Accounts Development Division, *Inflation Adjusted Cross and Net Sector and Sub-Sector Savings* (Ottawa, February 1985).

a. Capital consumption allowance from Table 7-8 plus III.

b. Non-financial capital acquisition from Table 7-8 less (IV + V).

TABLE 7-10 Actual and Cyclically Adjusted Budget Balance of Government Sector, 1964–83

	Actual	Adjusted	Difference (actual-adjusted)
1964	99	107	– 8
1965	207	– 8	215
1966	425	– 148	573
1967	148	– 52	200
1968	502	311	191
1969	1,915	1,549	366
1970	806	1,179	– 373
1971	130	313	– 283
1972	81	– 95	176
1973	1,252	– 68	1,320
1974	2,795	1,028	1,768
1975	– 4,049	– 4,009	– 40
1976	– 3,222	– 4,276	1,054
1977	– 5,005	– 4,432	– 573
1978	– 7,294	– 6,234	– 1,060
1979	– 4,630	– 4,063	– 567
1980	– 8,095	– 5,423	– 2,673
1981	– 5,440	– 3,177	– 2,223
1982	– 17,893	– 4,719	– 13,676
1983	– 24,333	– 9,283	– 15,050

Sources: Canada, Department of Finance, *Economic Review*, April 1984 (Ottawa: Minister of Supply and Services Canada, 1984), 186; unpublished data supplied by the Department of Finance.

on long-term bonds tended to correspond to periods in which the government was a supplier of funds (on an adjusted basis) to financial markets.⁵

THE INTERNATIONAL SECTOR

The foreign or international sector has generally acted as a net supplier of funds to Canada. In only five of the years studied did the excess of funding need show a demand by foreigners (Table 7-11). Interestingly, however, 1982 and 1983 were two such years. Furthermore, the change in the excess supply from 1981 to 1982 was more than \$8 billion. The 1982 experience also reversed an eight-year history of funds supplied to the Canadian economy from abroad.

A different picture of the international sector as a supplier of funds is presented by the inflation-adjusted data presented in Table 7-12. The international sector was a net monetary creditor during the entire period in that it held money-valued claims on the Canadian economy which exceeded its money-valued liabilities to Canadians. Although on an

**TABLE 7-11 Excess Funding Needs of the International Sector:
Unadjusted**

Year	I Non-financial capital acquisition	II Net savings	III Capital consumption allowance	IV Excess funding needs (I – II – III)
(\$ millions)				
1962	– 51	779	—	– 830
1963	– 34	487	—	– 521
1964	– 32	392	—	– 424
1965	5	1,135	—	– 1,130
1966	70	1,232	—	– 1,162
1967	128	615	—	– 487
1968	217	258	—	– 41
1969	162	1,079	—	– 917
1970	190	– 916	—	1,106
1971	247	– 184	—	431
1972	281	667	—	– 386
1973	350	242	—	108
1974	539	1,999	—	– 1,460
1975	495	5,252	—	– 4,757
1976	546	4,665	—	– 4,109
1977	455	4,789	—	– 4,334
1978	365	5,281	—	– 4,916
1979	544	5,384	—	– 4,840
1980	844	1,958	—	– 1,114
1981	1,095	7,160	—	– 6,065
1982	1,055	– 1,610	—	2,665
1983	735	– 951	—	1,685
Five-year averages				
1962–66	– 8.4	805.0	—	– 813.4
1967–71	188.8	170.4	—	18.4
1972–76	442.2	2,563.0	—	– 2,120.8
1977–81	660.6	4,914.4	—	– 4,253.8

Source: Statistics Canada, *Financial Flows Accounts*.

unadjusted basis, the international sector was a net supplier of funds to the Canadian economy in each five-year period but the second, the adjustment shown in Table 7-12 alters the pattern by reducing the supply of funds from the international sector throughout and by making it a net user of funds in each period but the first, 1962–66. The adjustment is especially significant during the 1977–81 period when the sector's supply of funds fell by over \$5 billion from an apparent \$4.2 billion to -\$0.8 billion. A similar adjustment of \$5.1 billion during 1982 showed that the international sector used \$7.8 billion during 1982.

TABLE 7-12 Excess Funding Needs of the International Sector: Adjusted

Year	I Net savings	II Inflation adjustment (assets)	III Inflation adjustment (CCA)	IV Adjusted net savings (I - II - III)	V Adjusted CCA ^a	VI Excess funding needs ^b
				(\$ millions)		
1962	779	258	—	521	—	-572
1963	487	217	—	270	—	-304
1964	392	244	—	148	—	-180
1965	1,135	456	—	679	—	-674
1966	1,232	586	—	646	—	-576
1967	615	503	—	112	—	16
1968	258	486	—	-228	—	445
1969	1,079	789	—	290	—	-128
1970	-916	232	—	-1,148	—	-1,338
1971	-184	590	—	-774	—	1,021
1972	667	973	—	-306	—	587
1973	242	2,180	—	-1,938	—	2,288
1974	1,999	2,599	—	-600	—	1,139
1975	5,252	2,604	—	2,648	—	-2,153
1976	4,655	2,640	—	2,015	—	-1,469
1977	4,789	629	—	4,160	—	-3,705
1978	5,281	1,306	—	3,975	—	-3,610
1979	5,384	8,209	—	-2,825	—	3,369
1980	1,958	6,401	—	-4,443	—	5,287
1981	7,160	8,777	—	-1,617	—	2,712

1982	-1,610	5,152	—	-6,762	—	7,817
1983	-951	2,417	—	-3,368	—	4,103
Five-year averages						
1962-66	805.0	352.2	—	452.8	—	-461.2
1967-71	170.4	520.0	—	-349.6	—	538.4
1972-76	2,563.0	2,199.2	—	368.8	—	78.4
1977-81	4,914.4	5,064.4	—	-150.0	—	810.6

Sources: Statistics Canada, *Financial Flows Accounts*; Statistics Canada, National Accounts Development Division, *Inflation Adjusted Cross and Net Sector and Sub-Sector Savings* (Ottawa, February 1985).

a. Non-financial capital acquisition from Table 7-11 less IV.

TABLE 7-13 Excess Funding Needs of the Financial Sector: Unadjusted

Year	I Non-financial capital acquisition	II Net savings	III Capital consumption allowance	IV Excess funding needs (I – II – III)
(\$ millions)				
1962	115	78	39	– 2
1963	92	72	44	– 24
1964	133	129	47	– 43
1965	159	168	47	– 46
1966	158	182	55	– 79
1967	108	216	67	– 175
1968	122	380	71	– 329
1969	223	303	77	– 157
1970	217	391	82	– 256
1971	327	491	92	– 256
1972	228	566	92	– 430
1973	348	590	99	– 341
1974	485	523	116	– 154
1975	555	980	107	– 532
1976	437	1,276	161	– 1,000
1977	743	1,264	201	– 726
1978	849	1,471	247	– 885
1979	1,148	1,287	287	– 619
1980	1,318	1,179	270	– 220
1981	1,538	1,407	318	373
1982	2,481	1,391	396	775
1983	2,559	3,322	406	– 309
Five-year averages				
1962–66	131.4	125.8	46.4	– 40.8
1967–71	199.4	356.2	77.8	– 234.6
1972–76	410.6	787.0	115.0	– 491.4
1977–81	1,119.2	1,321.6	264.6	– 415.4

Source: Statistics Canada, *Financial Flows Accounts*.

THE FINANCIAL SECTOR

The financial sector consists of financial institutions which collect funds from the ultimate savers in the economy and channel these funds to the ultimate lenders. This sector, as shown in Table 7-13, is significant as neither a net supplier nor a net user of funds as illustrated by the fact the EFN of the financial sector was as a maximum only 10 percent of the household sector's EFN on an unadjusted basis for any period. While the adjustments for inflation do alter the EFN of the financial sector to some degree, it remains a relatively minor supplier of funds except for the period 1972–76, when its supply exceeded that of the household sector.

A better perspective on the activities of these financial institutions can be gained from the first column of Table 7-15, which shows the net increase of financial assets held by financial institutions. This measure captures the extent to which financial institutions have acquired the claims of ultimate lenders. The third column of Table 7-15 shows that the flows through financial institutions were greater, sometimes by a substantial margin, than the net savings of the economy in each period. The proportion in excess of unity reflects a shifting by ultimate lenders away from existing direct lending to lending through intermediaries. This measure shows that overall, intermediaries have become an increasingly important element in the movement of funds from ultimate lenders to ultimate borrowers. Part of this increase in the relative activity of financial institutions may reflect changes in legislation which are discussed elsewhere. Similarly the introduction and spread of innovations, such as daily interest accounts, that have been facilitated by computer technology may have contributed to the increased use of intermediaries in the last period.

As in the case of our other measures, the growth of the financial sector is overstated as a result of inflation. In any year, some of the apparent growth of intermediaries will reflect the effects of a rising price level. The required adjustments to the increase in financial assets range up to over 80 percent of the unadjusted figures for the five-year periods (Column IV, Table 7-15). It is also interesting to note that the adjusted figures for the rate of increase in financial assets of intermediaries relative to net savings show somewhat greater stability than do the unadjusted data.⁶ Over the 1962–81 period, the adjusted ratio remained within the range 29 to 78 for all four five-year periods.

AN OVERVIEW

The EFNs for each sector are presented on both an unadjusted and an inflation-adjusted basis in Table 7-16. A number of patterns emerge from the unadjusted data for the four five-year periods. Households are net suppliers of funds, and the corporate sector is a net user of funds throughout the period. Moreover, the supply of funds from households grew from roughly fifty percent to more than equality with corporate use of funds. In comparison, the government and international sectors were relatively unimportant as either suppliers or users of funds, except during the 1962–66 period, when the supply of funds from the international sector was 80 percent that of households.

A somewhat different picture emerges from the inflation-adjusted data. Corporate EFN is substantially smaller and also exhibits smaller growth (to four and one-half times its original level contrasted to more than eight times for the unadjusted). Moreover the household's supply of

TABLE 7-14 Excess Funding Needs of the Financial Sector: Adjusted

Year	I Net savings	II Inflation adjustment (assets)	III Inflation adjustment (CCA)	IV Adjusted net savings (I-II-III)	V Adjusted CCA ^a	VI Excess funding needs ^b
	(\$ millions)					
1962	78	15	—	63	39	13
1963	72	16	—	56	44	-13
1964	129	17	—	112	47	-29
1965	168	33	—	135	47	-24
1966	182	44	—	138	55	-29
1967	216	23	—	193	67	-184
1968	380	14	—	366	71	-364
1969	303	15	—	288	77	-232
1970	391	-80	—	471	82	-417
1971	491	-36	—	525	92	-407
1972	556	-62	—	618	92	-675
1973	590	-150	—	740	99	-842
1974	523	-262	—	785	116	-718
1975	980	-69	—	1,049	107	-802
1976	1,276	-94	—	1,370	161	-1,108
1977	1,264	-53	—	1,317	201	-1,136
1978	1,471	-125	—	1,596	247	-1,202
1979	1,287	-1,216	—	2,503	287	-1,940
1980	1,179	-724	—	1,903	270	-1,982
1981	1,407	-1,419	—	2,826	318	1,021

1982	1,391	180	—	1,211	396	1,516
1983	3,322	-192	—	3,514	406	-500
Five-year averages						
1962-66	125.8	25.0	—	100.8	46.4	-22.4
1967-71	356.2	-12.8	—	368.6	77.8	-320.8
1972-76	787.0	-127.4	—	912.4	115.0	-829.0
1977-81	1,321.6	-707.4	—	2,029.0	264.6	-1,047.8

Sources: Statistics Canada, *Financial Flows Accounts*; Statistics Canada, National Accounts Development Division, *Inflation Adjusted Cross and Net Sector and Sub-Sector Savings* (Ottawa, February 1985).

- a. Capital consumption allowance from Table 7-13 plus III.
- b. Non-financial capital acquisition from Table 7-13 less (IV + V).

TABLE 7-15 Net Increase of Assets of Financial Sector Relative to Savings

Year	I	II	III	IV	V	VI
	Total increase in financial assets	Total net savings	Increase in financial assets Net savings	Inflation adjustment (financial assets) ^a	Adjusted net increase in financial assets	Adjusted increase in financial assets Net savings ^b
		(\$ millions)	(ratios)	(\$ millions)		(ratios)
1962	5,399	4,567	1.18	610	4,789	1.05
1963	8,518	4,700	1.81	1,051	7,467	0.88
1964	7,452	5,549	1.34	1,535	5,917	0.79
1965	6,130	7,357	0.83	2,182	3,948	0.64
1966	7,702	8,900	0.87	3,379	4,323	0.56
1967	8,487	8,036	1.06	3,244	5,243	0.62
1968	11,869	8,161	1.45	3,081	8,788	0.74
1969	11,544	10,566	1.09	4,623	6,921	0.60
1970	11,785	7,624	1.55	5,487	6,298	0.53
1971	13,764	8,910	1.54	4,015	9,749	0.71
1972	21,428	11,741	1.83	7,356	14,072	0.66
1973	27,801	16,170	1.72	15,627	12,174	0.44
1974	27,286	22,924	1.19	30,488	-3,202	-0.12
1975	27,019	22,298	1.21	24,453	2,566	0.09
1976	41,087	24,506	1.68	25,006	16,081	0.39
1977	45,946	23,692	1.94	22,495	23,451	0.51
1978	74,118	25,072	2.96	24,054	50,064	0.68
1979	64,896	34,838	1.86	46,623	18,273	0.28
1980	77,474	33,958	2.28	56,397	21,077	0.27
1981	89,486	40,561	2.21	61,288	28,198	0.32

1982	39,986	23,812	1.68	66,709	-26,723	0.67
1983	52,528	29,081	1.81	37,054	15,474	0.29
Five-year averages						
1962-66	7,040	6,214.6	1.20	1,751	5,289	0.78
1967-71	11,490	8,659.4	1.34	4,090	7,400	0.64
1972-76	28,924	19,527.8	1.53	20,586	8,338	0.29
1977-81	70,384	31,624.2	2.25	42,171	28,213	0.41

Source: Statistics Canada, *Financial Flows Accounts*.

a. Calculated as inflation rate as measured by the GNE deflator times average of beginning of year and end of year financial assets.

b. Net savings do not require adjustment because the inflation adjustment sums to zero over all sectors of the economy.

TABLE 7-16 Excess Funding Needs: Overview in \$ millions

	Households	Corporate	Government	International	Financial
Unadjusted Excess Funding Needs					
1962-66	-1,076	1,853	126	-813	-41
1967-71	-2,293	3,023	-47	18	-235
1972-76	-7,201	8,478	1,572	-2,121	-491
1977-81	-16,677	16,647	5,457	-4,253.8	-415
1982	-36,228	21,744	19,463	2,665	775
1983	-33,019	9,247	22,563	1,685	-309
Adjusted Excess Funding Needs					
1962-66	-150	1,033	-366	-461	-22
1967-71	-508	1,327	-1,061	538	-321
1972-76	-464	1,410	-171	78	-829
1977-81	-4,296	4,716	1,188	811	-1,048
1982	-18,628	6,418	13,225	7,817	1,516
1983	-24,898	4,045	19,204	4,103	-500

Note: These statistics do not balance because the item "Residual Error of Estimate" has been omitted.

funds to meet the corporate sector's EFN was much less important than on the unadjusted basis; it exceeded one-half of corporate EFN in only one period. The diminished importance of the household sector made the international sector the largest supplier of funds in one period and the government sector the largest supplier in another. Significantly, the international sector was a net user of funds in all periods after the first.

The patterns for 1982 and 1983 are substantially different from those of the five-year periods. In the unadjusted data, households remain the largest supplier of funds but government displaces the corporate sector as the most important user, taking over one-third more funds than business. It is also notable that the international sector became a user rather than a supplier of funds over these years. These patterns become accentuated in the adjusted data. Households remain suppliers of large amounts of funds; government remains the largest user. During these years the international sector became a larger user of funds than the corporate sector.

To what extent are the patterns of 1982 and 1983 aberrations, and to what extent do they reflect new forces in the economy? Several of the differences in the financial flows reflect the particular circumstances of these years. The large net use of funds by the international sector appears to reflect the aftermath of takeovers following the incentives for Canadianization in the National Energy Program, as well as factors in other countries such as the high real interest rates in the United States. The small use of funds by the corporate sector and the large use by government reflect the stagnant economic conditions of these years and would likely be reversed by the return of the economy to higher levels of activity.⁷

The Scale and Structure of Financial Assets and Claims

A different perspective on the working of financial markets can be gained from examining the stock of financial assets held or issued by each of the major sectors. In contrast to the financial flows considered in the previous section, which show the intersectoral flows of finance, the balances of financial assets and liabilities measure the instruments in which the various sectors have either accumulated their savings or which they have used to finance their acquisition of real assets in the past.

Two types of comparisons are made in this section. First, the overall sizes of the stocks held and issued by the various sectors are compared. This analysis is the stock counterpart of the analysis in the previous section which discussed the relative importance of the different intersectoral flows on a period-by-period basis. Second, each of the sector stocks is examined to determine the degree and types of shifts that have occurred among the financial instruments it issued or held.⁸ Both comparisons are given for 1961, 1971 and 1982 and for all sectors except the financial sector, which is treated in more detail in the following section.

Size of Sector Assets and Liabilities

The patterns of financial assets and liabilities shown in Table 7-17 roughly correspond to what might be expected from the patterns of financial flows. The household and international sectors are the net

**TABLE 7-17 Stocks of Financial Assets and Financial Liabilities
by Sector, 1961, 1971 and 1982**

	Financial Assets	Financial Liabilities	Net Assets
		(\$ billions)	
1961			
Households	62.6	16.6	45.9
Corporate	21.8	70.1	−48.9
Government	23.9	35.2	−11.3
International	26.2	9.2	17.1
1971			
Households	143.6	50.1	93.6
Corporate	56.7	164.7	−107.9
Government	62.0	72.0	−10.2
International	59.3	27.6	31.7
1982			
Households	557.5	186.6	390.9
Corporate	232.3	661.4	−429.1
Government	191.3	263.2	−71.9
International	270.1	134.1	136.1

Source: Statistics Canada, *National Balance Sheet Accounts 1961–84*.

lenders to the corporate and government sectors. Households are the largest holders of financial assets overall and in net assets. Again, not surprisingly, the corporate sector is the largest issuer of claims to other sectors in both total claims and net claims. Interestingly enough, the net positions of households and incorporated business almost balance each other at all three observation points.

The Household Sector

In 1961, as shown in Table 7-18, households and unincorporated businesses held roughly equal proportions of currency and deposits, stocks, life insurance and pensions, and only a slightly smaller proportion of bonds. Together these assets comprised over 90 percent of the total held by this sector.

The most noticeable change throughout the period has been the proportion of financial assets held in the form of currency and deposits, which increased from 25 percent in 1961 to 36 percent in 1982. By the same token, the share of bonds held within the portfolio has shown the most dramatic decline: from 18 percent in 1961 to 10 percent in 1982. Stock holdings, too, have declined as a proportion of household assets. In 1961 stocks constituted 27 percent of assets and in 1982, only 22 percent.⁹ Holdings of life insurance and pensions have remained steady in the 22 to 23 percent range.

The increased holding of currency and deposit may be attributed to several factors. Up to 1967, the chartered banks collectively set the interest rates to be paid on their deposits. The prohibition of this practice in the 1967 Bank Act appears to have resulted in more vigorous competition which led the banks, as the major supplier of deposits, to compete more effectively with other investment assets. The continuing increase in the share of currency and deposits after 1971 arose more from market forces than because of regulatory changes.

The innovations late in the period of daily interest savings accounts and daily interest chequing accounts would tend to increase the demand for deposits by households (Freedman, 1983). The former was adopted by major chartered banks in 1979 and the latter in 1981, though both were adopted by smaller banks, some trust companies, credit unions and caisses populaires earlier. The increase in currency and deposits is also consistent with the desire of households to remain more liquid in response to the uncertainties created by the growth of inflation.

Another notable change was the decline from 1961 in the share of stocks and bonds in household assets. At most, only part of the decline in stocks could be attributable to the 1972 capital gains tax because much of the decline occurred prior to its introduction. The decline in bonds is the obverse side of the desire for increased liquidity. In addition, bonds, especially long-term bonds, suffered substantial negative returns over much of the period (Table 7-5).

TABLE 7-18 Major Financial Assets of Households and Unincorporated Businesses, Proportion of Total Financial Asset

	1961	1971	1982
Currency and deposits	0.25	0.32	0.36
Mortgages	0.03	0.04	0.02
Bonds	0.18	0.15	0.10
Life insurance and pensions	0.23	0.22	0.23
Stocks	0.27	0.25	0.22

Source: Statistics Canada, *National Balance Sheet Accounts 1961–1984*.

Note: The proportion of assets not included can be calculated by summing the columns.

TABLE 7-19 Major Financial Liabilities of Households and Unincorporated Businesses

	1961	1971	1981
Financial assets (\$ billions)	62.6	143.6	577.5
Financial liabilities (\$ billions)	16.7	50.1	186.6
Liabilities as a proportion of assets (percentage)	27	35	32
Proportion of total liabilities (percentage) ^a			
Payables	33	31	25
Loans	11	14	11
Mortgages	55	55	62

Source: Statistics Canada, *National Balance Sheet Accounts 1961–1984*.

a. The proportion of liabilities not included can be found by adding the yearly proportions of payables, loans and mortgages.

Table 7-19 presents both the total liabilities issued by the households and their composition. As might be expected from the financial flows discussed earlier, household assets exceed liabilities by a substantial proportion. Still, over the period, the household sector's financial liabilities have increased from 27 percent of financial assets to almost 32 percent.

One probable factor contributing to this changed balance has been the altering age structure of the population. Families typically go into debt at the initial stages of forming a household because of expenditures on consumer durables and housing. By 1971, part of the baby boom had reached the stage of household formation and, by 1981, most had begun the process of acquiring a house.

The comparison of financial assets and liabilities does not by itself indicate the state of solvency of households. Even though financial liabilities have grown more rapidly than financial assets, the excess of assets over liabilities has grown at the same time. Moreover, in addition to financial assets, households also hold real assets such as homes and automobiles. In 1961, the net financial assets of households were \$43 bil-

lion, but they had grown to \$336 billion by 1982. In real terms, the \$336 billion becomes \$89 billion when adjusted to the 1961 price level, still twice that of 1961.

The pattern of the financial liabilities of households shows similar changes. Mortgages remained level at just over one-half of households' financial liabilities in the first two dates, but increased to over 60 percent of financial liabilities in 1982. Over the period, however, loans have grown and there has been an offsetting decline in payables. Rather than representing any real alteration in financing patterns, this latter adjustment may have reflected an increased importance of households relative to unincorporated business in this sector.

The Corporate Sector

As demonstrated earlier, the corporate or business sector is the primary user of funds generated by other sectors of the economy. The financial liabilities of this sector, as might be expected, are much larger than its financial assets (Table 7-20). At the beginning of the period its financial assets were just 30 percent of its liabilities. This proportion grew throughout the period, reaching 35 percent in 1982.

The corporate sector appears to have initially been able to economize on currency and deposit holdings from an initial level of 11 percent in 1961 to 7 percent in 1971, but the movement was reversed by 1982, when currency and deposits returned to their initial level. The significant change in the sector's financial assets has been a substantial increase in the share of claims on associated enterprises, from 32 percent to 38 percent.

The liability structure of the corporate sector, presented in Table 7-21, may be more important than the asset side for it represents the finance of the corporate sector's acquisition of real assets, the major source of investment in the productive capacity of the economy. The decrease in the share of stock outstanding from 41 percent in 1961 to only 32 percent in 1982 appears to reflect a reduced reliance on equity finance and a greater resort to debt finance. Within the category of corporate debt, some changes occurred during the period under review. A decreased reliance on corporate bonds, from 18 percent in 1961 to 14 percent in 1982, paralleled the decreased reliance on equity. The major growth in debt occurred in payables and loans.

Not too much significance should be attached to the apparent fall in the use of equity finance by the corporate sector because of limitations in the data. The financial flows accounts measure the book value but not the market value of outstanding corporate stock. The Department of Finance has prepared alternative estimates of the value of outstanding corporate equity capital for the non-financial corporate sector over the period 1966–81 which are based on market value. Table 7-22 presents alternative estimates for the shares of stock among financial liabilities of

TABLE 7-20 Major Financial Assets of Corporate Sector

	1961	1971	1982
Assets (\$ billions)	21.8	56.7	232.3
Liabilities (\$ billions)	70.7	164.7	661.4
Assets as a proportion of liabilities	0.31	0.34	0.35
Proportion of total assets (percentage)			
Currency and deposits	0.11	0.07	0.12
Receivables	0.32	0.34	0.30
Claims on associated enterprises	0.33	0.38	0.38

Source: Statistics Canada, *National Balance Sheet Accounts 1961-1984*.

TABLE 7-21 Major Financial Liabilities of Corporate Sector as a Proportion of Total Financial Liabilities

	1961	1971	1982
Payables	0.07	0.09	0.10
Loans	0.07	0.08	0.16
Bonds	0.18	0.16	0.14
Total debt	0.42	0.45	0.53
Claims on associated enterprises	0.17	0.18	0.15
Stock	0.41	0.37	0.32

Source: Statistics Canada, *National Balance Sheet Accounts 1961-1984*.

TABLE 7-22 Major Financial Liabilities of Corporate Sector as a Proportion of Total Financial Liabilities: Adjusted

	1961	1971	1981
		(percentage)	
Payables	n.a.	0.08	0.10
Loans	n.a.	0.08	0.13
Bonds	n.a.	0.16	0.12
Total debt	n.a.	0.45	0.49
Claims on associated enterprises	n.a.	0.18	0.13
Stock	n.a.	0.40	0.38

Sources: Statistics Canada, *National Balance Sheet Accounts 1961-1984*, and unpublished estimates from the Department of Finance.

the corporate sector in 1971 and 1981, the latest year for which this estimate is available. The data in Table 7-22 show that stocks as a proportion of financial liabilities remained close to the 1961 level shown in Table 7-21 in both 1971 and 1981. The apparent decline in the proportion of stock therefore appears to reflect the failure of the data to capture the effects of inflation.

The International Sector

The international sector maintains a net asset position with Canada in terms of financial instruments. Comparison of financial assets (Table 7-23) and financial liabilities (Table 7-24) reveals that the assets have always exceeded liabilities by at least a factor of two, though the ratio declined from 2.8 in 1961 to 2.0 in 1982. Nevertheless, the net asset position has increased both in money terms from \$17 billion in 1962 to \$136 billion in 1982 and in real terms to \$44 billion in 1961 dollars.

The liabilities of the international sector to Canadians have changed greatly from 1961 to 1982. At the beginning of the period official reserves and claims on associated enterprises were the two largest categories and were roughly equal. Since that time, Canadian official foreign exchange holdings have just doubled whereas other holdings of foreign financial assets by Canadians have increased 14-fold.¹⁰ As a consequence, official reserves have fallen from over one-quarter of the financial liabilities of the rest of the world to under three percent. The other category to decline in relative terms was foreign investment, representing the ownership of Canadians in foreign enterprises, which fell from 17 percent in 1961 to only 8 percent in 1982. These declines were offset by large increases in currency and deposits and claims on associated enterprises. The movement in currency and deposits was not steady. It increased from 10 percent in 1961 to 31 percent in 1971 but then declined to 21 percent in 1982.¹¹ The other significant increase occurred in claims on associated enterprises, and its movement reversed the pattern of currency and deposits. These claims fell from 28 percent of the international sector's financial liabilities in 1961 to only 24 percent in 1971 but increased sharply to 44 percent in 1982. The divergent trends of foreign investment, which fell, and claims on associated enterprises, which rose, indicate that more Canadian investment abroad is being conducted by Canadian multinational corporations rather than through portfolio investment.

The other side of the international sector is its claims on Canadians. As can be seen from Table 7-23, claims on associated enterprises have been historically the largest single item, despite its steady fall from

TABLE 7-23 Major Financial Assets of the International Sector

	1961	1971	1982
Assets (\$ billions)	26.1	59.3	270.1
Currency and deposits (percentage)	2	12	20
Bonds (percentage)	19	20	29
Claims on associated enterprises (percentage)	58	53	37
Stocks (percentage)	10	4	2

Source: Statistics Canada, *National Balance Sheet Accounts 1961-1984*.

TABLE 7-24 Major Financial Liabilities of the International Sector

	1961	1971	1982
Liabilities (\$ billions)	9.2	27.6	134.1
Official reserves (percentage)	26	17	3
Currency and deposits (percentage)	10	31	21
Loans (percentage)	18	13	17
Claims on associated enterprises (percentage)	28	24	44
Foreign investment (percentage)	17	11	8

Source: Statistics Canada, *National Balance Sheet Accounts 1961–1984*.

58 percent in 1961 to 37 percent in 1982. The decline of this item has been matched by the growth of currency and deposits and bonds. Currency and deposits cover only the foreign business of Canadian branches of the chartered banks and do not take into account their extensive international business. Still, non-residents increased the proportion of their financial assets in Canada held in currency and deposits from only 2 percent in 1961 to 20 percent in 1982. Overall, then, in contrast to Canadians' holdings of claims on the rest of the world, the claims on Canadians held by the international sector appear to have shifted away from direct investment toward portfolio investment.

The Changing Structure of the Financial Sector

The financial system is an important element of the saving-investment process in any modern economy. Only a small part of the total funds transmitted flows directly from ultimate borrowers to ultimate lenders. Rather, financial institutions borrow from ultimate lenders while simultaneously lending to ultimate borrowers.¹²

Flow of Funds Comparisons

For present purposes, the financial sector consists of those institutions which borrow from ultimate lenders and lend to ultimate borrowers (see note 12). This definition corresponds to sectors VI, VII, VIII and IX of Statistics Canada's flow of funds accounts. Sector VI can be characterized as consisting of deposit institutions that issue money claims fixed in money value to the customers. These deposit institutions include the chartered banks (VI.1) and the near banks (VI.2), primarily the trust companies (VI.2.3), and the credit unions and caisses populaires (VI.2.4). Sector VII consists of institutions that issue long-term claims tied to specific purposes, such as insurance or pensions. The sector includes life insurance companies (VII.1) and trustee pension plans (VII.3). Sector VIII includes a variety of institutions including fire and casualty insurance (VIII.3), sales finance and consumer loan companies

TABLE 7-25 Average Annual Change in Financial Assets Held in Various Financial Institutions

Period	Financial Sector	Deposit Institutions	Long-term Institutions	Other Institutions ^a
Changes in financial assets, \$ millions ^b				
1962-66	6,739	3,153 (47)	1,434 (21)	2,152 (32)
1967-71	10,713	5,842 (55)	1,918 (18)	2,953 (28)
1972-76	27,931	16,998 (61)	4,977 (18)	5,956 (21)
1977-81	67,639	39,205 (58)	12,148 (18)	16,286 (24)
Percentage of net savings				
1962-66	108	51	23	35
1967-71	124	68	22	35
1972-76	143	87	26	30
1977-81	213	123	38	51

Source: Statistics Canada, *National Balance Sheet Accounts 1961-1984*.

a. Other institutions include Sectors VIII and IX in the flow of funds accounts.

b. Percentage of total shown in parentheses.

(VIII.5), investment dealers (VIII.3), and mutual funds (VIII.2). Finally, sector IX consists of government financial institutions.

Table 7-25 shows the relative importance of different classes of financial institutions in the flows of funds for different periods. During all periods except the first, the deposit institutions either equalled or exceeded the combined totals of the other two categories of financial institutions. During the 1962-66 period they accounted for approximately 47 percent of the flows through the financial system. This share increased to approximately 60 percent of the total flows for each of the last two periods. The long-term financial institutions in the initial period had 21 percent of the flows but declined to only 18 percent in the later periods. Other financial institutions accounted for over 30 percent of flows during 1962-66 but their share fell to approximately 24 percent in the remaining periods.

A number of factors have accounted for this shift in the pattern from the 1967-71 period on. First, the 1967 revision to the Bank Act removed some constraints upon the ability of the chartered banks to compete with other financial institutions. Second, from the late 1960s on, the increasing levels of inflation favoured the development of financial institutions with the ability to adapt to the changes in market conditions brought about by inflation. Third, the Canadian mortgage market has undergone a number of changes which have affected the relative positions of dif-

ferent financial institutions. Finally, as mentioned earlier, a number of innovations, especially at deposit institutions, made their liabilities more attractive to households.

Prior to 1967, the chartered banks were subject to two distinctive constraints: a 6 percent ceiling on the rate of interest that they could charge on loans and a prohibition against lending through conventional mortgages. Of the two, the 6 percent ceiling proved to be more significant. As interest rates rose through the 1960s, the chartered banks found themselves less able to compete for funds with financial institutions that were not constrained in this regard. The interest ceiling affected different parts of the chartered banks' lending activities to differing degrees. For example, an activity such as consumer credit, where a high interest rate was required to offset small loans together with relatively high rates of default, was constrained to a greater degree than others.

A second feature of chartered banking prior to 1967 was the agreement among the banks to set common interest rates to be paid on deposit. This policy enhanced the opportunities for other institutions to attract funds away from the chartered banks. Indeed, when competition among banks was limited, it may have been rational for the banks as a whole to pursue a policy with a high margin on a lower level of business than might arise with full competition.

The increase in inflation from the mid-sixties on affected the ability of different financial institutions to compete for funds. As inflation became increasingly expected, the level of market interest rates adjusted upward. Moreover, increased uncertainty about inflation appears to have led both lender and borrower to use short-term financial instruments to a greater degree. Thus institutions specializing in longer-term instruments, such as life insurance companies, found it more difficult to compete both for funds and for opportunities to place these funds.

The changes in the mortgage market were several. Mortgage arrangements shortened in effective maturity in common with other financial investments.¹³ From 1969 on, the five-year mortgage became the standard contract for residential finance. Later mortgage lenders emphasized even shorter terms in response to the variability of inflation. The other factor influencing the mortgage market was the substantial increase in the demand for mortgage finance arising from the formation of households of the baby boom generation.

The innovation among deposit institutions has already been discussed. Although daily interest accounts were introduced by the banks only late in the period under review, these accounts had been offered by some credit unions, caisses populaires and trust companies as early as the late sixties. Still, given the significance of the banks, this factor is of importance mainly for the final five-year period.

The effects of these influences on financial markets can be seen from comparison of Table 7-25 with Table 7-26, which documents the division of

TABLE 7-26 Average Annual Change in Financial Assets of Selected Institutions

Period	Deposit Institutions				Long-term Institutions					Other
	All Financial Institutions	Banks	Near Banks	Credit Unions and Caisses Populaires	Trust Companies	Mortgage Loan Companies	Life Insurance	Trusteed Pension	Sales Finance Companies	
1962-66	6,739	2,077 (31)	1,076 (16)	287 (4)	471 (7)	292 (4)	793 (12)	641 (10)	415 (6)	252 (4)
1967-71	10,713	4,214 (39)	1,627 (15)	552 (5)	715 (7)	325 (3)	872 (8)	1,046 (10)	253 (2)	197 (2)
1972-76	27,931	11,563 (41)	5,435 (19)	2,117 (8)	2,197 (8)	1,026 (4)	2,466 (9)	2,511 (9)	1,131 (4)	-28 (..)
1977-81	67,639	27,749 (41)	11,456 (17)	3,794 (6)	5,060 (7)	1,984 (3)	3,488 (5)	7,177 (11)	686 (1)	440 (1)

Source: Statistics Canada, *National Balance Sheet Accounts 1961-1984*.

Note: Percentage of total shown in parentheses.

indirect finance among financial institutions in more detail. As shown in Table 7-25, deposit institutions increased their share of the flows through financial institutions from 47 percent in the period prior to the Bank Act revision to 58 percent in the final two periods. This increased share of deposit institutions arose mainly because the chartered banks' share grew from 31 percent of the total funds flowing through financial institutions in the first period to 41 percent in the last. The fact that the majority of this growth occurred in the 1967–71 period suggests that much of it can be attributed to removal of some of the constraints in the 1967 Bank Act revision. Overall, this improvement did not come from the near banks which maintained their share at 16–17 percent. Within the near banks, the credit unions and caisses populaires increased their share from 4 percent to 6 percent, whereas the trust companies and mortgage loan companies each maintained their shares relatively constant.

The effects of the change in the Bank Act in 1967 can also be shown for financial institutions other than the banks and near banks. The share of these institutions declined to the benefit of the banks. The consumer loan and sales finance companies, in particular, had been sheltered from bank competition in consumer lending. The removal of the 6 percent ceiling eliminated this shelter and, as a consequence, the share of this group of institutions fell from 6 percent in the 1962–66 period to approximately 1.5 percent in the final period.

Finally, the effect of inflation appears to have had the greatest impact on insurance companies among long-term institutions and on mutual funds among other institutions. The share of the life insurance companies declined from 12 percent in the first five-year period to only 5 percent in the final period, whereas mutual funds appear to have experienced outflows of funds in the 1972–76 period. The decline of the life insurance companies reflected the apparent disfavour of the long-term instruments on both sides of the market; the decline of the mutual funds reflects the poor performance of the stock market over the period, attributed by many to inflation.¹⁴

Balance Sheet Comparisons

SHARES OF INSTITUTIONS

The flows of funds through financial institutions reflect their role in transmitting to ultimate borrowers funds currently generated by ultimate lenders. These flows augment the stock of funds already passed through financial institutions. A different perspective on the roles of different financial institutions can be gained from comparing their balance sheets at different points over the period under review.

Table 7-27 shows the share of financial sector assets held by each

TABLE 7-27 Share of Financial Sector Assets by Financial Institutions

	1961	1971	1982
		(\$ millions)	
All financial institutions	43,749	131,003	646,795
Deposit institutions	18,988	63,961	358,923
	(43)	(48)	(55)
Chartered banks	14,433	45,891	242,739
	(32)	(35)	(38)
Credit unions and caisses populaires	1,508	5,706	37,040
	(3)	(4)	(6)
Trust companies	1,598	7,530	47,289
	(4)	(6)	(7)
Mortgage loan companies	1,120	4,208	27,299
	(3)	(3)	(4)
Long-term institutions	12,992	29,749	130,374
	(30)	(23)	(20)
Life insurance companies	8,911	17,243	56,873
	(20)	(13)	(8)
Trusteed pensions	4,081	12,515	70,258
	(9)	(10)	(11)
Other	11,769	37,293	158,128
	(21)	(28)	(24)
Sales finance	2,381	5,720	12,808
	(5)	(4)	(2)
Mutual funds	652	2,901	5,231
	(1)	(2)	(1)

Source: Statistics Canada, *National Balance Sheet Accounts 1961-1984*.

Note: Percentage of total shown in parentheses.

group of financial institutions. As can be seen, the patterns are quite consistent with the previous analysis of flows. The deposit institutions increased their share dramatically from 43 percent in 1961 to 55 percent in 1982, and the increase was evenly spread among deposit institutions. The banks' share rose by 6 percent, while the trust companies, mortgage loan companies, credit unions and caisses populaires increased their shares from 1 to 3 percent each. Almost all of this increase was matched by an equally dramatic fall in the share of the long-term institutions — insurance companies and trustee pension funds — which fell 10 percent from 1961 to a level of 20 percent in 1982. Of this group, the life insurance companies declined the most dramatically, from 20 percent share of assets in 1961 to 8 percent in 1982.

PATTERNS OF FINANCE

The changing shares of indirect finance attributable to the different types of financial institutions raises an interesting question with respect to patterns of finance. The financial institutions that grew relative to others had at the

TABLE 7-28 Composition of Major Assets of Financial Sector

Asset	Proportion of Total Assets		
	1961	1971	1982
Currency and deposit	0.04	0.09	0.07
Consumer credit	0.07	0.05	0.07
Loans	0.16	0.17	0.23
Government securities			
Government of Canada treasury bills	0.03	0.02	0.03
Government of Canada bonds	0.12	0.06	0.03
Provincial and municipal bonds	0.06	0.08	0.06
Corporate bonds	0.08	0.06	0.05
Mortgages	0.16	0.21	0.19
Stocks	0.05	0.07	0.06

Source: Statistics Canada, *Financial Flows Accounts*.

beginning of the period substantially different combinations of assets in their portfolios than those that shrank. Did the changing importance of different institutions, each with its own traditional holdings, become reflected in the overall holdings of different financial instruments by the financial sector as a whole, or did the financial institutions adjust their holdings so as to affect the shift among institutions?

These questions can be answered by examining the composition of balance sheets of the financial sector's financial assets and financial liabilities presented in Table 7-28. Three categories of assets increased between 1961 and 1982. Currency and deposits grew from just 4 percent to 7 percent of total financial assets, with most of the growth occurring in foreign currency deposit holdings by the financial institutions. Bank loans other than consumer credit have increased from 16 percent in 1961 to 23 percent in 1982, with most of the change happening in the second period. Finally, holdings of mortgages grew through the period, increasing to 19 percent in 1982 from 16 percent in 1961.

The major categories that decreased their share were various categories of bonds. Federal government securities, the sum of treasury bills and bonds, decreased from 15 percent of financial assets in 1961 to only 6 percent in 1982. Similarly, bonds issued by corporations decreased from 8 percent to 5 percent. The change in corporate bonds should be viewed in the perspective of the increased share of bank loans mentioned earlier. Both of these forms are primarily sources of finance for the corporate sector. When combined, the total finance flowing to business through these forms increased from 24 percent to 28 percent.

The final category consists of financial assets that remained roughly unchanged, consumer credit and stocks. Interestingly enough, those categories were financed by institutions — sales finance companies, consumer loans companies, life insurance companies and mutual

funds — which themselves declined substantially. This steady flow of finance reflects the portfolio shifts of other institutions which respond to the incentives and, in the case of the chartered banks, their expanded powers to service these markets.

Conclusion

The purpose of this paper has been to describe the major trends and changes in Canadian financial markets over the past 20 years. Interpretations have been offered only where the apparent causes are well recognized. Still it may be useful to sum up the most important findings.

The supply of funds to market by various sectors showed considerable volatility over the period under review. Much of this volatility was the direct outcome of inflation, though in two different respects. The presence of inflation required that savings data be adjusted to reflect the distorting effects of inflation purely in terms of measurement. In addition, it appeared that episodes of unexpected inflation tended to affect the savings behaviour of households and business.

Two trends in savings patterns should be noted. Households saved a higher proportion of disposable income as the period progressed. Although some of these increased savings reflected the distortion to measurement caused by inflation, a trend persisted after adjustment. The other trend was the change in the role of government. At the start of the period, government was a net supplier of funds; by the end, government was one of the largest users of funds.

Substantial changes occurred within the financial sector. Legislative revision, inflation and innovation all contributed to strong growth in deposit institutions at the expense of long-term financial institutions. Despite this change in relative size of financial institutions, the resulting pattern of finance through the financial sector remained essentially unchanged as institutions altered their portfolio compositions to compensate.

Despite the many forces acting on financial markets, some of which were unprecedented in previous Canadian experience, such as inflation and change in the structure of the population, certain features remained virtually unchanged. Households remained the most significant supplier of funds throughout the entire period. Even some of the perceived instability turned out to be more apparent than real; much of the apparent sharp increase in personal savings relative to personal disposable income disappeared once savings were adjusted for the effects of inflation.

Notes

This study was completed in January 1985.

The authors are indebted to John Sargent for his patient guidance, to several anonymous referees for their useful comments and to the editors for their skilful work.

1. The data used in this study are based on data developed by Statistics Canada. The method is described in George Haydu, "Statistics Canada Inflation Adjustment Model for the Canadian System of National Accounts: Technical Description," study prepared for the Royal Commission on the Economic Union and Development Prospects for Canada, November 1984. Further explanation of the general method together with an illustrative method can be found in Canada (1984, pp. 17–18).
2. The following equations are not actually used by Statistics Canada in making its adjustments. These equations do represent the conceptual underpinnings for any adjustment.
3. This difference between the two adjustments is explainable as follows. The adjustment to assets depends on the current rate of inflation, whereas the adjustment to capital consumption depends on the difference between the current price level and the price level at the time of acquisition. The early part of the period had been preceded by relatively mild inflation. As a result, the difference in price levels was comparatively small. The persistence of inflation over the period under review made this difference greater through the latter part of the period.
4. For example, the calculation of the cyclically adjusted balance for 1983 was based on an assumed output growth of 2.4 percent and an unemployment rate of 7 percent.
5. The anomaly — 1980 — corresponded to a small net use of funds.
6. Note that net savings do not need any adjustment. The adjustment for effects of inflation on monetary claims balances out over the whole economy.
7. The difference between the actual and inflation-adjusted budget balances of government are \$12.6 billion in 1982 and \$15.3 billion in 1983, magnitudes roughly equal to the inflation-adjusted need for funds.
8. Only major assets and liabilities are described for each sector. As a result, different categories of claims will be described for the different sectors. One major limitation of the data should be mentioned at the beginning. Corporate stocks are not valued at current market value. This shortcoming means that some apparent changes in balance sheets should be treated with caution. In the most important case, corporate financing, alternative estimates are presented in an attempt to overcome this problem.
9. The holdings of stocks by households are determined as a residual after all holdings of stocks by other sectors are deducted from the stock liabilities and retained earnings of corporations. Moreover, all stocks are evaluated at book value.
10. The gold component of official reserves is valued at historic cost. This procedure imparts a substantial downward bias to the growth of official reserves over the period.
11. This category consists almost entirely of foreign currency deposits issued to Canadians by the foreign sector. It reflects the desires of Canadians to diversify their deposit holdings into other currencies.
12. A discussion of the advantages of financial intermediaries to ultimate lenders and ultimate borrowers can be found in Shearer, Chant and Bond (1984). The advantage of this indirect finance arises from the ability of financial institutions to transform the characteristics of claims more valued by ultimate lenders. It should be noted that this definition includes important activities commonly identified with financial markets. The brokerage and underwriting activities of investment dealers do not require them to acquire the claims issued by borrowers. Rather they arrange for their sale to ultimate lenders.
13. See Howitt (1985) and Lessard (1975) for further details on the changing maturity of mortgages.
14. See Pesando (1977) and Chant and McFetridge (1979). Another factor with respect to mutual funds has been their valuation at book value. Unlike most financial institutions, the book value of mutual funds may not be an accurate gauge of current market value.

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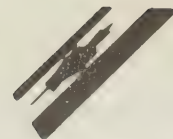
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OCT 19 1988

